

## The Effects of Color on Patient Recovery Process Centered at Child Psychology

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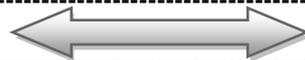
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### ABSTRACT

having developed technology and increasing effects of this on diseases cure and special diseases we tried to investigate these factors and their impacts on human psyche and spirit. Thus, having in mind that children will make the future of the state and noting their health is of high importance we investigated the effects of light and color as an internal factor for hospital specialized in child care. Within developing countries like Iran, one puts high importance for this issue. This study is in range of fundamentals and based on comparative and logic methods. Correlation and other common methods within psychology were used to study the issue better like color questionnaire. One can practice to analyze indices and criteria within users' ethology. Through this one can make better the relation between human and the environment and provide generalization fields for patients cure applying light and color within internal architecture. Data analysis showed that the effects of light and color on formation way of human ethical patterns can be organized in three general indices; skeletal, performance, and organization besides sub-indices based on priority and effect level. Data analysis also indicated that they can be studied well to provide patterns for patient's recovery process.

**KEY WORDS:** Psychology, Light and Color, Hospital, Children

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### I. INTRODUCTION:

Many comments on way of designing effects on people's psyche have been investigated within environmental psychology theories. Designers and psychologists have discussed this issue since many years ago but its subjects are applied by most of major architectural designers. or about internal space: "spatial hierarchy has established in a way that people to be able to connect socially" (Lang, 2011). But here the color and light become very useful. These comments suppose that the color and light can affect people's psyche and soul. In addition, one issue is applying natural light regarding locations (Halimi, 1991). Architectural internal patterns and furniture are being focused on to recognize the level of effects coming from their arrangement and appliances color and have tightly interrelated with human psyche and soul. Although different theoretical arguments have been performed within investigation for various subjects on environment psychology, the psychology of color and its relation with human soul, there have been less done on effects of these subjects on illness trend which is considered innovative aspect of this paper. Resources have been applied by authors regarding some parts of this paper viewpoint are as follows:

In an article, SeyyedSadr (2007) has practiced the investigation for architecture, color and human. Based on this resource one can suggest that the color within architecture context have investigated spatial arrangement and analytical performance of the color within spaces. But based on plotted authors' discussions, it's within space and appearance of a structure and its relation with inside of construction per volume that visual- quality aspects are displayed.

### II. COLOR IN ARCHITECTURE AND ITS RECOGNITION

A usual person's sound eyes are able to recognize more than one million colors put beside each other. This ability within an ideal light situation rises to ten million colors. If one accepts that human eyes can have this ability, the words fail to name these colors. There is required a system and method which afford colors classification, selection and recognition (Ayatollahi, 2007). Through this we will be able to recognize hundreds of colors. Transparency degree and brightness form the color value like the difference between light and dark red.

The level of purity implies also the effectiveness rate or low/high purity or impurity of color. For an instance, if 5% green is combined to 95% of blue, then blue color will be different in two resulted colors. This mostly assesses the third factor in case of gray color. In other words, color purity is believed as a relation between color absolute saturation limit and gray color level combined with that. Careful measurement of three key factors, color value and purity wouldn't be feasible(Dehdashti & Porpirar, 1998).

### III. THE PSYCHOLOGY OF COLOR

Color and chromatics are considered as a science today. Different aspects of color including color and light physics, colors chemical structure, color sociology, color iconology, color within plastic arts, semiology and color approaches, color spirituality and mythology, color therapy or its natural elements, and psychological aspects of color on human are studied from different views within various sciences. This study investigates the psychology of color and its effects on human. Having been interested by scientist, human science researchers, psychologists and philosophers and even common people within 20<sup>th</sup> century, this aspect of color is being used for therapy, learning more about consultancy customers' morale and even better selection while employing them. Color and colors within modern psychology are applied as criteria while measuring individuals' personality. Because they have their own effects on individuals' mental and corporal aspects and by this their personality are represented by color(Elliot & Maier, 2009). This has been demonstrated through development within physiology and psychology. What's historical studies indicated is that human permanently had been affected by colors and this issue rose during last century due to color industry development. In this paper, in addition to presenting major aspects of main colors psychology, we tried to practice characteristic features of individuals who prioritize these colors within Loschers' test. Louschers' color test is the basic of color selection. This test is the newest theory follows the well-known Roshakh test regarding human personality recognition through colored ink stains(Elliot, et al, 2011; Abizade,1993) .

Table 1: colors psychology

Psychological comment	colors
Fear or devil	black
Innocence and cleanliness symbol	white
Passion, warmness and closeness	red
Peace, security and discipline	blue
Irritation and wrath feeling	yellow
Excitement, eagerness	orange
relaxing	pink
Intellectuality and logic	purple
calmness, prosperity, health and jealousy	green
heat, passion, welfare and security	brown

#### Color and colored lights

Red, blue and yellow are main colors and main light colors are red, blue, green; these two groups are just different in green and yellow. A very bright experience within darkness; I find projector button, press it and the light is on, there is green rectangular light on the screen. So far everything is usual and catchable, that is I implemented green color apparatus then the green rectangular light appeared on the screen. I also turn on the second projector and there is a red light next to the green one.

I move the red color projector to coincide completely on the green. The created light from their combination is a bright and transparent one in yellow; yes, it is the yellow light. When the third projector is turned on there is another blue colored rectangle beside this weird yellow on the screen which is reflection of blue filter set on this projector. Now the final step comes with an incredible result. I change the blue light such that to coincide completely the yellow one. Finally by combination of these three colors what appears on the screen is white light.

**IV. LIGHT AND COLOR SIGNIFICANCE IN THERAPY**

Biological sense of light and sun light effects on improvement is one issue that hasn't investigated highly(Valdez & Mehrabian, 2004). It's essential that long hospitalized patients to be exposed to certain light to have their blood circulation and metabolic process properly work. Designers of clinical sites should be informed on bio effects of light. Based on recent studies, it's been demonstrated that sudden exposure of light causes adrenal glands to be excited. Regarding illumination of clinical sites it's better to inspire turning day and night and create similar conditions to natural lights(Elliot, et al, 2011; Veitch & Newsham, 1998). On wall art works are desirable for nerve system. Cold and hot colors' effects and also light is a vast area to discuss. For instance, high contrast results in headache and eye pressure. Internal designing has different consequences including consciousness rise, quandary and absent-mindedness, sense of passing time, cultural relation, bleakness and exhilarant(Bellizzi et al.,2003). Knowing about new color theories and their relation with architectural forms is a considerable issue.

**Research methodology**

This research is explanatory- analytical whose data has been collected through questionnaire and library methods. Statistical population includes patient children. Samples were selected randomly and sample number is 30 persons. The questionnaire has compiled as color pattern for hospital areas to assess the psychology of color by those children.

**The way of color selection in an area**

There are 8 cards indicating an area which contain their numbers one side and the other side is colored. These colors include:

Table 2: Number of Color

Color	Number
Gray	0
Blue	1
Green	2
Red	3
Yellow	4
Violet	5
Brown	6
Black	7

To select a color fit to a certain individual we can do following steps:

- [1] Take cards. Mix them then put them such that the colored side faces you. T
- [2] Look at them and think of you in the space. L
- [3] Choose your favorite card then put it near the biggest number left side. C
- [4] Look at other colors and choose most favorite. Put it near the first selected number side up. L
- [5] Do section four for other cards such that all them be in a row numbers up and your most favorite color in leftmost and less favorite in rightmost. D
- [6] Read numbers from left to right and write them on a paper respectively. R

- [7] P  
pick up cards and mix them. Put them again on the table in front of yourself.
- [8] R  
repeat sections 2-6. Select cards in a way that it's the first time you see them.
- [9] W  
write numbers on the paper right under already written numbers.

Do these steps next:

- [1] A  
After completing 8 steps and choosing colored cards you have to rows of color one under the other, for example:

2] 7    3] 6    4] 0    5] 2    6] 3    7] 4    8] 1    9] 5  
10] 7    11] 0    12] 6    13] 3    14] 2    15] 5    16] 4    17] 1

- [18] M  
Make four pairs out of eight digits of two rows. Mark first pair by +, second by \*, third by = and fourth by -. Pairs of digits are so within considered example:

19] -6-7                      20] -2-0                      21] 3\*4\*                      22] +5+1+  
23] 0-7-                      24] -3-6-                      25] 2\*5\*                      26] 1+4+

- [27] In  
addition, first and end digits of each row make fifth pair marked by +-. By this two other pairs are formed.  
+1-7    +5-7

Thus, the results can be used proper to following table within the psychology of color and selection calculating abovementioned numbers and digits and select space colors. The following is a table for colors comparison.

Table 3: Gray comparison to other colors(Seyedsadr, 2007)

Gray to black	Gray to brown	Gray to violet	Gray to yellow	Gray to red	Gray to green	Gray to blue	Gray to gray
+0-7	+6-0	+0-5	+0-4	+3-0	+2-0	+0-1	<b>-0+0</b>
1. independent action leading to adventure 2. lack of external factors interference	1. voiding to participate activities 2. unable to say No	1. misuse 2. distrust to people	1. hopelessness 2. new goals ending in failure	1. intolerance to evokes 2. anxiety and anger	1. considerable mental pressure 2. try to record the position	1. lack of emotional needs to be met 2. tense and pressure	1. idea divergence 2. fearing to obtain own right

Table 4: Blue comparison to other colors

Blue to black	Blue to brown	Blue to violet	Blue to yellow	Blue to red	Blue to green	Blue to gray	Blue to blue
+1-7	+1-6	+1-5	+1-4	+1-3	+1-2	+1-0	+1-1

1. disagreement with others 2. lone demanding	1. respect demanding 2. mutual respect	1. distrust to people	1. unmeet desires 2. high anxiety	1. life enthusiasm dwindle 2. seek for proper conditions	1. tense from effort 2. feeling inefficiency	1. peaceful and stable conditions	1. idea divergence
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Table 5: Green comparison to other colors

Green to black	Green to brown	Green to violet	Green to yellow	Green to red	Green to gray	Green to green
+2-7	+2-6	+2-5	+2-4	+2-3	+2-0	+2-2
1. preventing others interference 2. position consolidation	1. need of being respectful 2. self esteem	1. position consolidation and self esteem	1. fear and despair of unfruitfulness 2. others easily influence on individual	1. life enthusiasm dwindle 2. effort despair	1. fear of impediment to achieving desires	1. idea divergence

Table 6: Red comparison to other colors

Red to black	Red to brown	Red to violet	Red to yellow	Red to green	Red to blue	Red to grey	Red to red
+3-7	+3-6	+3-5	+3-4	+3-2	+3-1	+3-0	+3-3
1. challenge restriction 2. try to accomplish goals	1. activity enjoyment 2. love to be admired	1. freely acting interest 2. logic and rational achievement	1. Despair of unfruitfulness 2. developments faces obstacles	1. tense from personal efforts	1. emotional dissatisfaction 2. mental pressure	1. fear of desires achievement	1. idea divergence

Table 7: Yellow comparison to other colors

Yellow to black	Yellow to brown	Yellow to violet	Yellow to red	Yellow to green	Yellow to blue	Yellow to gray	Yellow to yellow
+4-7	+3-6	+4-5	+3-4	+4-2	+4-1	+4-0	+4-4

1. development restriction 2. wish to have peaceful companionship	1. love to be respectful 2. seek another situation	1. high critical view 2. accomplishment with rational and logic	1. life enthusiasm dwindle 2. opacities	1. tense from personal efforts 2. self-esteem reinforcement	1. emotional dissatisfaction 2. better position expectancy	1. fear of desires achievement	1. idea divergence
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Table 8: Violet comparison to other colors

Violet to black	Violet to brown	Violet to yellow	Violet to red	Violet to green	Violet to blue	Violet to gray	Violet to violet
+5-7	+6-5	+4-5	+3-5	+5-2	+5-1	+5-0	+5-5
1. strict about being criticized 2. wish to have peaceful companionship	1. influenced by manifest qualities 2. imitation	1. hopefulness 2. conditions going well	1. life enthusiasm dwindle 2. opacities	1. tense from personal efforts 2. self-esteem reinforcement	1. emotional dissatisfaction 2. better position expectancy	1. fear of desires achievement obstacles	1. idea divergence 2. others contempt

Table 9: Brown comparison to other colors

Brown to black	Brown to violet	Brown to red	Brown to yellow	Brown to green	Brown to blue	Brown to gray	Brown to brown
+6-7	+6-5	+4-6	+3-6	+6-2	+6-1	+6-0	+6-6
1. strict about being criticized 2. wish to have peaceful companionship	1. influenced by manifest qualities 2. imitation	1. hopefulness 2. conditions going well	1. life enthusiasm dwindle 2. opacities	1. emotional dissatisfaction 2. self-esteem reinforcement	1. emotional dissatisfaction 2. better position expectancy	1. fear of desires achievement obstacles	1. idea divergence 2. others contempt

Table 10: Black comparison to other colors

Black to brown	Black to violet	Black to red	Black to red	Black to green	Black to blue	Black to gray	Black to black
+6-7	+7-5	+4-7	+3-7	+7-2	+7-1	+7-0	+7-7

1. need respect from others 2. be in attention center	1. natural inability 2. disagrees others' ideas	1. hopelessness 2. nullity	1. life enthusiasm dwindle 2. annoyance, irritation	1. emotional dissatisfaction 2. feeling inefficiency	1. emotional dissatisfaction 2. lack of perception	1. fear of desires achievement obstacles 2. destructive contempt	1. idea divergence 2. individualism and others contempt
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**V. RESEARCH RESULTS**

The results of questionnaires study are presented in following table.

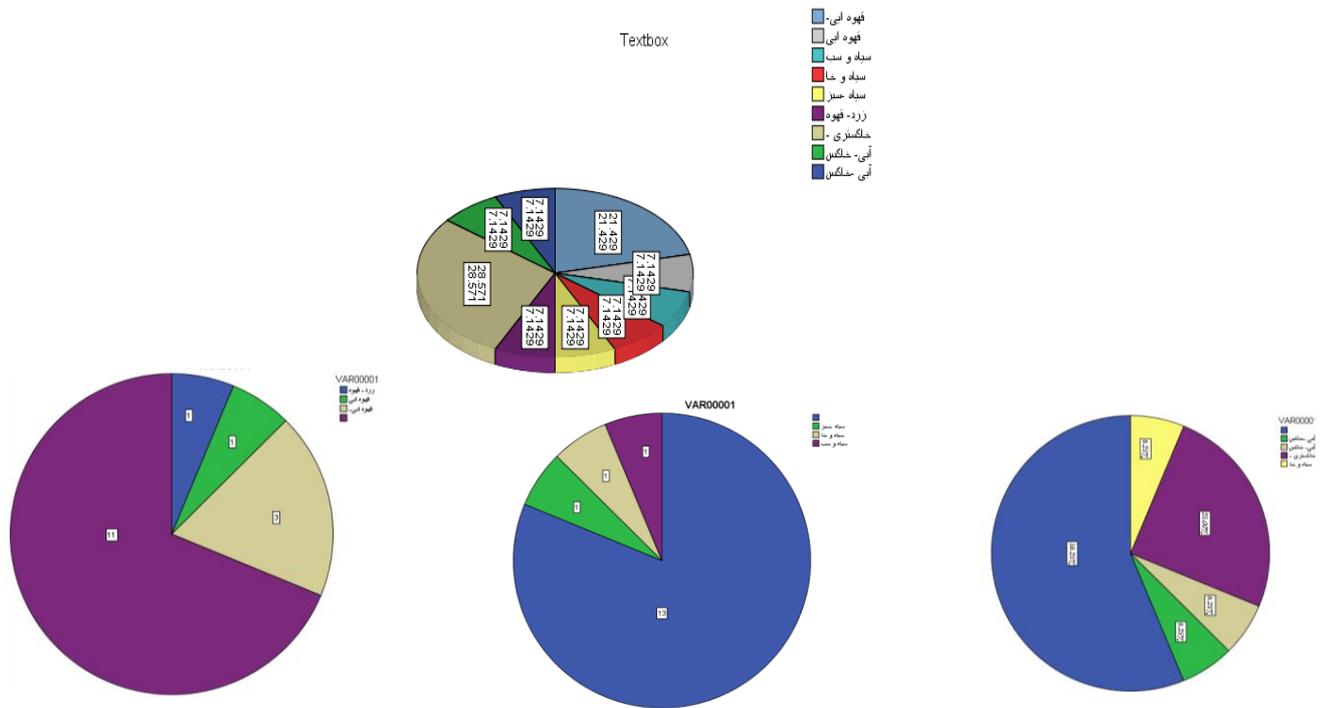
Table 11: The results of questionnaires study

Calculate	Result	Statistics								
		7	6	3	5	4	0	2	1	
2-6 Brown-Green		7	6	3	5	4	0	2	1	
2-6 Brown-Green		7	6	1	4	3	5	2	0	
7-2 Black- Green		4	7	3	6	5	1	2	0	
7-0 Black-Gray		3	0	1	4	5	6	2	7	
6-4Brown-Yellow		7	6	0	3	1	2	4	5	
0-1 Gray- Blue		7	0	6	3	5	4	1	2	
2-0 Gray- Green		3	0	1	4	5	1	2	7	
7-2 Black- Green		4	7	1	6	5	1	2	3	
2-6 Brown-Green		7	6	3	5	4	0	2	1	
2-0 Gray- Green		3	0	1	4	5	6	2	7	
4-6 Yellow- Brown		7	6	0	3	1	2	4	5	
1-0 Blue-Gray		7	0	6	3	5	4	1	2	
1-0 lue-Gray		7	0	6	3	5	4	1	2	
2-0 ray- Green		3	0	1	4	5	1	2	7	

The results of tables and graphs show that almost 50% of people have been affected by yellow and brown and nearly 43% have pointed to black and green. Colors high influence on internal architecture has psychological and mental effects on children. 35% of them said that black and gray have moderate effect index on children psych and environment salinity. Questioners believe that colors shouldn't be highly dark or bright rather they should be neutral in environment to induct happiness or sadness to patients.

Table 12: The results of questionnaires study

	Frequency	Percent	Valid Percent	Cumulative Percent	Bootstrap for Percent <sup>a</sup>			
					Bias	Std. Error	BCa 95% Confidence Interval	
							Lower	Upper
Blue-Gray	1	7.1	7.1	7.1	-7.1	.0	.0 <sup>b</sup>	.0
Blue-Gray	1	7.1	7.1	14.3	-7.1	.0	.0 <sup>b</sup>	.0
Yellow- Brown	1	7.1	7.1	21.4	-7.1	.0	.0 <sup>b</sup>	.0
Black- Green	1	7.1	7.1	28.6	-7.1	.0	.0 <sup>b</sup>	.0
Black-Gray	1	7.1	7.1	35.7	-7.1	.0	.0 <sup>b</sup>	.0
Black- Green	1	7.1	7.1	42.9	-7.1	.0	.0 <sup>b</sup>	.0
Brown-Green	1	7.1	7.1	50.0	-7.1	.0	.0 <sup>b</sup>	.0
Brown-Green	3	21.4	21.4	71.4	-21.4	.0	.0 <sup>b</sup>	.0
Gray- Blue	4	28.6	28.6	100.0	-28.6	.0	.0 <sup>b</sup>	.0
Total	14	100.0	100.0		.0	.0	.	.

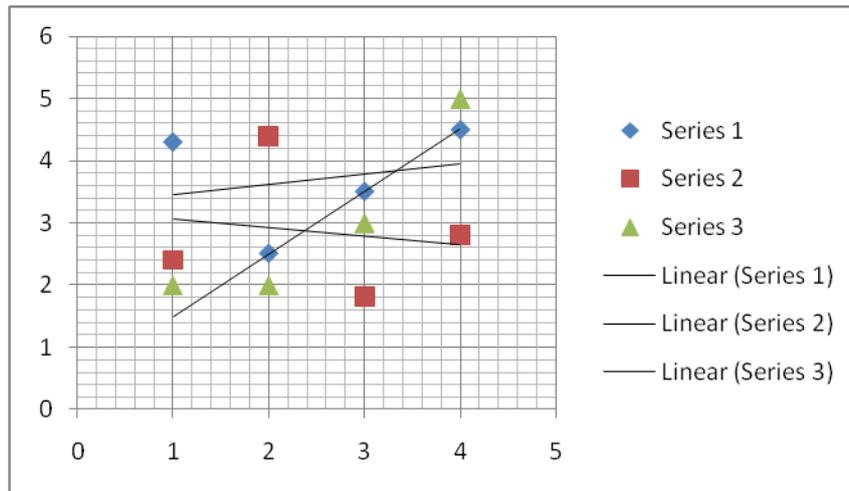


Percent of gray color

Percent of black color

Percent of brown color

Based on the above graph, one can categorize all analyses in three main indices. Through their analysis one can consider final results to put to the work and apply, proportionate to them, approaches for children's hospital spaces. These indices are put in the graph and their results are then studied.



Graph1: Evaluation of questionnaire indexes

They are results of these three colors combined to other colors. They are:

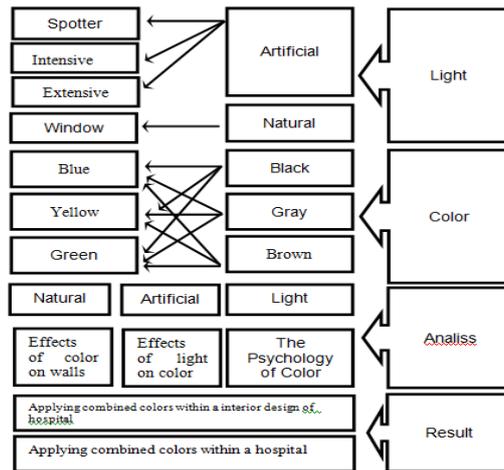
- [1] Black
- [2] Brown
- [3] Gray

These three colors in combination to other colors are highly effectual on people's psyche that was analyzed in above graph. In spite of general thoughts, these colors change their affecting properties when combined to others and affect people in different way. Within conclusion this aspect has been proposed for spaces.

## VI. CONCLUSION:

Questionnaire analysis imply that the combination of gray have been noticed by users and respondents among effective colors on users. They pointed to their complements having relative significance and energetic and also transparent colors. These colors combined to gray gave remarkable effects on users mind. Although transparent color absorbs the colors combined to, makes these areas considerably relaxing. Users aren't well informed about these colors because they aren't used within their areas and may not be welcomed for the first time. Based on above analyses we can make use of following items to design children's hospital atmosphere that may be effective for patient's improvement.

- [1] Combining transparent colors to gray or black to moderate spaces.
- [2] Not to use pure white within these places due to two reasons: hard to clean; and lack of energy and without any color specific effect.
- [3] Applying green, yellow, blue within spaces
- [4] Combining abovementioned colors with black, gray, and brown.
- [5] Green, yellow, and blue are colors that makes self-confidence and double the energy of people.



Graph2: color aspect to internal design of a hospital

### RESOURCES

- [1] Abizade, V., 1993, The Psychology of Color, Dirsa Publish, Tehran.
- [2] Ayatollahi, H., 2007, Foundations of Visual Arts, The study and drafted the books of Social Sciences, Samt Tehran.
- [3] Bellizzi, J. A., Crowley, A. E., & Hasty, R. W. (2003). The effects of color in store design. *Journal of retailing*, 59(1), 21-45.
- [4] Dehdashti Shahrokh, F. & Porpirar, N., 1998 , Karang Publish, Tehran.
- [5] Elliot, A. J., & Maier, M. A. (2009). Color and psychological functioning. *Current Directions in Psychological Science*, 16(5), 250-254.
- [6] Elliot, A. J., Maier, M. A., Moller, A. C., Friedman, R., & Meinhardt, J. (2011). Color and psychological functioning: the effect of red on performance attainment. *Journal of Experimental Psychology: General*, 136(1), 154.
- [7] Halimi, M.H., 1991, Publication of the Ministry of Culture and Islamic Guidance.
- [8] Lang, J., 2011, Architecture Theory, publication of the University of Tehran, Tehran
- [9] Seyedsadr, A., 2007, Archetectura , Light and Human, Asarnashr Publish, Iran.
- [10] Valdez, P., & Mehrabian, A. (2004). Effects of color on emotions. *Journal of Experimental Psychology: General*, 123(4), 394.
- [11] Veitch, J.A. & Newsham, G.R., 1998, Determinatns of Lighting Quality I: State of science.