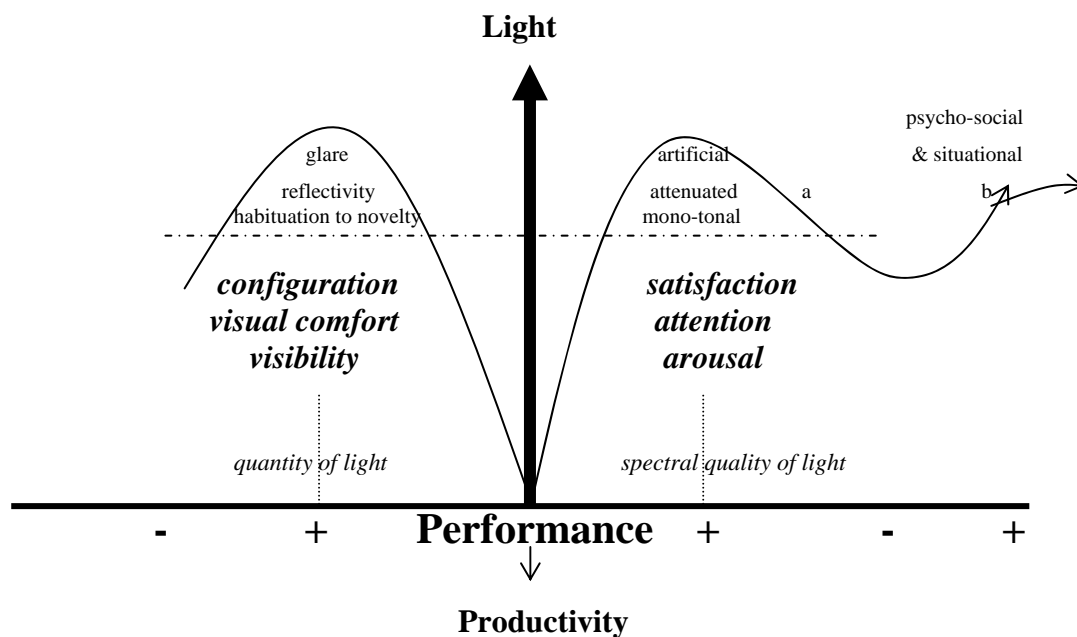


Robert Samuels, 1997: Conceptual Relationships between Light, Performance and Productivity: physical and psychological dimensions



Quantity of Light:-

Visibility or visual acuity increases with increasing illumination, with a corresponding enhancement in task performance (particularly for smaller and/or more complex and contrasting visual tasks), and then progressively decreases at a certain level of illumination – where glare and veiling reflections *ie visual discomfort* (and, indirectly, even thermal discomfort) diminish performance and productivity. Generally, natural light is preferred and thus better tolerated than artificial light at equivalent intensities. Individual susceptibility will also vary according to experience, age, genetics. Furthermore, novelty increases performance until habituation occurs, with a corresponding decrease in productivity over time. *Configuration* refers to luminance distribution *ie* percentage of light on walls, ceilings and surfaces. There is a preference for situations where walls are also illuminated; which, fortuitously, is a natural characteristic of interior daylight.

Quality of Light:-

To the extent that light (in buildings) matches the natural spectrum of daylight, neuro-endocrine arousal and biological-clock regulation are enhanced, with an associated improvement in attentiveness, positive mood and satisfaction. As spectral quality diminishes (*ie* artificial lighting progressively diverges from natural daylight, and/or interior daylight ‘attenuated’ by transmission through glass) photo-chemical imbalance/stress increases - and symptoms such as lethargy and depression tend to occur. Furthermore, daylight not only naturally varies but also embodies salient information (time of day, weather conditions etc). This is experienced as more satisfactory than uniform/monotone light. At an indeterminate point (a) situational and psycho-social dimensions intervene *ie*: intentions, preferences, motivations, self-image, past experiences, status and responsibility (roles). These expectations and interactions are neither consistent nor are their consequences predictable (b); hence the difficulty of establishing any absolute relationship between light, performance and productivity.

		ACTIVITY/SPATIAL BEHAVIOUR					
AROUSAL, ATTENTION	<i>outdoors</i>	<i>workshops</i>	<i>verandah</i>	<i>assembly</i>	<i>classrooms</i>	<i>library</i>	
	<i>courtyards</i>	<i>canteen</i>	<i>entry</i>	<i>corridors</i>	<i>staffrooms</i>	<i>computer</i>	
		<i>gym</i>		<i>stairwells</i>	<i>music/art</i>		
	<i>long wavelength</i>						
Stimulated							
Energetic, Noisy							
Active, Dynamic							
Hi-Metabolic Rates							
Contemplative							
Concentration							
Sedentary, Silent							
Attentive, Calm							
Lo-Metabolic Rates							
Archetypal	passion		joy	knowledge		wisdom	
Symbolism →	emotion		spirit	hope		mystery	
[Chromatic/positive]							
LIGHT :	FULL SPECTRUM/DAYLIGHT-SIMULATING FLUORESCENT LIGHT & UV						
	INTERIOR/ATTENUATED DAYLIGHT						
	NATURAL DAYLIGHT/OPEN WINDOWS						
	Performance guideline, not prescriptive (activity x spatial design x Variables)						
	Colour Band can shift (indicated by →)						
	Variables:						
	Age of students (primary/secondary)						
	Materials & Finishes						
	Furnishing, Carpeting						
	Patterns (stripes, patches, multi-coloured cloth/wallpaper, etc)						
	Interior displays (posters, artwork, graphics...) add colour/variety/spice						
	Colour of edging, door and window frames, detailing, adds variety						
	Not rainbow : saturation can mimic colour properties (cool-warm)						
	Climate (warmer → cooler colours)						
	Multi-Culturalism x Suburban Majority x Ethnic Colours ?						
	Urban x Rural (sophistication; regional flavours)						
	Time of day x activity (cool to warm light: morning to afternoon)						
	Geography, (coastal symbolism etc)						
	School Colours; school uniform colours						
	Optics (direction of daylight, silhouettes, glare, receding/advancing colours)						
	Spatial Form (shape of room - elongated, rotund etc, & linearity emphases)						
	Heritage Building x Heritage Colours						

Light and Performance

Both diagrams illustrate elements of the interaction between Light, the Built Environment and Behaviour and Well-Being.

Full spectrum light can be natural daylight or artificial daylight-simulating light. The neuro-endocrine system is implicated in the response that humans have to light. Because they are frequently indoors and light indoors is normally *not* full spectrum

(even indoor daylight is ‘attenuated’)

the integration of light into buildings can have profound affects on satisfaction, health, mood, attentiveness, and productivity.