The IES is the recognized technical authority on illumination. For over ninety years its objective has been to communicate information on all aspects of good lighting practice to its members, to the lighting community, and to consumers through a variety of programs, publications, and services.

The strength of the IESNA is its diversified membership: engineers, architects, designers, educators, students, contractors, distributors, utility personnel, manufacturers, and scientists, all contributing to the mission of the Society: to advance knowledge and disseminate information for the improvement of the lighted environment to the benefit of society.

The Society publishes nearly 100 varied publications including recommended practices on a variety of applications, design guides, technical memoranda, and publications on energy management and lighting measurement. The Society, in addition, works cooperatively with related organizations on a variety of programs and in the production of jointly published documents and standards.
Lighting Quality

Patterns of light and dark affect both our perceptions of the world and our emotional and physiological responses, and thus they are essential in gathering information about the physical world.

Good-quality lighting can support visual performance and interpersonal communication and improve our feelings of well-being.

Poor-quality lighting can be uncomfortable and confusing and can inhibit visual performance.

The overall purpose of lighting is to serve the needs of people.

The role of the lighting designer is to match and rank the needs of the people using the space with the economic and environmental considerations and the architectural objectives, and then to translate the results into a workable design and functional installation.
Lighting Quality

Human needs
- Visibility
- Task performance
- Visual comfort
- Social communication
- Mood and atmosphere
- Health, safety, well-being
- Aesthetic judgment

Economics / Environment
- Installation
- Maintenance
- Operation
- Energy
- Environment

Architecture
- Form
- Composition
- Style
- Codes/standards
Central to human needs is visibility, because it is the detection and organization of light patterns that allow a person to analyze and evaluate the environment.

Once objects and patterns are visible, one can use a pencil to write a note, learn to pronounce new words by following the facial expressions of a teacher, walk down a corridor without bumping into a vacuum cleaner on the floor, appreciate a painting, or feel relaxed in a dimly lighted restaurant.
Lighting For Humans
Lighting For Humans
Lighting For Humans
Visibility

Visibility is the ability to extract information from the field of view, whether that information is the location of a curb or of a flower arrangement. It is a necessary condition for good-quality lighting.

Lighting installations exist to enable sight. The most powerful variables influencing the visibility of objects are:

- Contrast
- Background Luminance
- Time
- Size

Age modifies this relationship; for the older viewer, the task must be larger and brighter and its contrast higher in order to achieve visibility levels equivalent to those of younger viewers.

The rain in Spain stays mainly on the plane.
Task Performance

Task performance is an essential human need. The task is the user's activity, whether measuring the size of a room, washing mud off hands, reading room numbers posted in a corridor to find a doctor's office, or seeing the details in the etchings displayed in a museum.

Lighting must enable users to perform the "work" they came to do.

Task performance and visual performance are not synonymous; in fact, several nonvisual factors contribute significantly to task performance. Training, motor skills, motivation, and many other human factors interact with visibility to affect the level of task performance.
Lighting for Human Needs

Mood and Atmosphere

Needs for mood and atmosphere encompass the emotional response to the luminous environment. Preference, satisfaction, relaxation, and stimulation are influenced by lighting. These mood states can indirectly influence other behaviors, such as task performance.
Visual Comfort

Visual comfort is an essential human need that can affect task performance, health and safety, and mood and atmosphere.

Glare can cause discomfort and interfere with visibility. Direct glare occurs when the light travels directly from the source to the eye. This may include "disability glare," "discomfort glare," and "overhead glare".

What's wrong with this picture?

- Specular louvers
- Cave effect
- Dark colored finishes
- No light on ceiling
- Shadows

Bad
Lighting for Human Needs

Visual Comfort

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Good
Aesthetic Judgment

Aesthetic judgment needs differ from emotional responses. **Humans appear to need to make sense of what they see, so the information must be either immediately available in a scene or implied.**

Lighting can communicate meaning, reinforce rhythmic patterns in the architecture, and enhance color, thereby creating a hierarchy of social significance in the visual field.

Lighting can also hinder understanding by introducing patterns that conflict with the underlying scene. One research model that attempts to quantify aesthetic judgments uses four dimensions of appraisal:

- Coherence
- Legibility
- Mystery
- Complexity
Aesthetic Judgment

Another uses visual interest and visual lightness (room surface brightness). These studies conclude that preference for a scene increases when the lighting is nonuniform; however, high levels of one quality can reduce levels of another. For example, a scene that is complex may rank low in coherence.
Lighting for Human Needs

Health, Safety, and Well-Being

Although they are needs of primary importance, health, safety, and well-being are often overlooked. As an example, flicker from some electric lighting can produce a stroboscopic effect with moving machinery, making the machine appear to move at a different rate. Electronic ballasts for fluorescent lamps reduce the perception of flicker, and it also appears that they reduce the incidence of headaches and eyestrain.

Safety is an important need, but emergency lighting is only one aspect of it. Lighting also affects the visibility of curbs, stair edges, train platforms, roadway intersections, and labels of critical chemicals and pharmaceuticals.
Social Communication

Social communication needs include the creation of luminous conditions conducive to such communications in a setting, especially by facial appearance.

Much human communication occurs by nonverbal means, but these cues are missed if the lighting distracts from or masks the information. Facial recognition, for example, which is a critical element of security lighting, is influenced not only by the amount of light needed to detect a face, but also by the modeling of facial features created by the pattern of the light and shadow on the subject's face.
Light Patterns in Architecture... for clarity
Light Patterns in Architecture... for architectural relationships
Light Patterns in Architecture... for function
Light Patterns in Architecture
Light Patterns in Architecture
Light Patterns in Architecture
Luminance Patterns

Specific luminous patterns have a consistent and definable effect on an occupants' subjective impression of a space.

Designers can use these patterns to create spaces which are appropriate for the intended use. Each pattern reveals its opposite as well: for example, to make a space seem more public, a designer can look at the criteria for making a space seem private and do the opposite.

- Spaciousness / Confinement
- Visual Clarity / Haziness
- Relaxation / Activation
- Private / Public
Privacy: Privacy is light being in the shadows. Lighting patterns which are overall low, non-uniform, and darker zone of the occupant than in the surroundings will reinforce an impression of privacy. Vertical rather than horizontal surfaces should be lit.
Luminance Patterns

Relaxation:
Relaxation also implies non-uniform lighting, with non-uniform wall lighting contributing to this impression. Warm color sources contribute to a relaxing feeling. Aspects of the patterns for relaxation can be effectively combined with those for visual clarity to create effective and comfortable work environments.
**Visual Clarity:**
Visual clarity refers to the crispness and distinctness of the visual environment, rather than how well a task can be seen. Visual clarity is reinforced by shadows, by emphasis on horizontal surfaces such as the work plane and the ceiling, and by higher luminous in the center of the room.
Luminance Patterns

Spaciousness:
Relatively bright ceilings and wall are particular importance to reinforce a sense of spaciousness. Uniform illumination also helps make the room feel spacious.
The Three Elements of Light

General or Ambient lighting
provides an area with overall illumination. Also known as ambient lighting, general lighting radiates a comfortable level of brightness, enabling one to see and walk about safely.

Task Lighting or Lighting at the Work plane
helps you perform specific tasks such as reading, sewing, cooking, homework, hobbies, games, or balancing your checkbook.

Light or Highlighting
adds drama to a room by creating visual interest. As part of a decorating scheme, it is used to spotlight paintings, houseplants, sculpture, and other prized possessions, or to highlight the texture of a wall, drapery or outdoor landscaping.
The Three Elements of Light
Light Distribution Strategies

**General or Ambient Lighting:**
General lighting provides uniform illumination over the entire area of a room, allowing flexibility in the placement of workstations. Localized general lighting also provides approximately uniform illumination, but luminaries are located in a pattern that responds to the specific arrangement of workstations.

**Local or Task Lighting**
Local Lighting provides high illumination on relative small areas. It can be too bright and uncomfortable unless surrounding surfaces are also illuminated, as shown. Local lighting used with general lighting is called supplementary lighting.

[Diagram of light distribution strategies]
Distribution Types

- Direct
- Semi-Direct
- General Diffuse
- Direct-Indirect
- Semi-Indirect
- Indirect
General or Ambient: Recessed

Direct
General or Ambient: Recessed
General or Ambient: Recessed
General or Ambient: Recessed
General or Ambient: Pendant

Indirect

Direct
General or Ambient: Pendant

Semi-Indirect

Semi-Direct
General or Ambient: Pendant

Semi-Indirect
Accent: Asymmetrical Distribution at Wall

Asymmetrical Direct
Accent: Asymmetrical Distribution at Wall

Pendant

Asymmetrical Direct
Accent: Asymmetrical Distribution at Wall

Recessed

Asymmetrical Direct
Accent: Asymmetrical Distribution at Wall

Surface

Asymmetrical Indirect / Direct
What Is The Desired Look?

- Light Mapping
- Direction of Light
- Painting with Light
Light Mapping

... use a number scale to define bright to dim illumination

10 ............... 5 ............... 1
Bright       Mid       Dim
Painting with Light

... use a “values” of white or color to define layers of light

- sparkle
- focus
- ambient
Direction of Light

... use arrows to define direction or distribution of light

Downlight

Glow

Uplight