

Requirements for easily recognizable graphic symbols

-Discussion based on previous studies and case studies of consumer products-

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The purpose of this study is to arrange design requirements of graphic symbols (icon symbols) used for on-board display, and to present a guideline for practical use. Major literatures on international standards such as ISO/IEC, cognitive science, semiotics, and usability from 1990 to 2024 were systematically reviewed (20 articles). In addition, representative graphic symbols were collected and classified from home appliances and cars on the market, and comparative analysis was carried out (product samples: 11 items). The selection of major books on iconography and concepts was reinforced by the advice of university professors in cognitive science, philosophy, and design.

The method consists of the following three steps. (1) Evaluation viewpoints of graphic symbols and existing guidelines were extracted from standards and academic literatures, (2) cases of home electric appliances and vehicles were systematically classified by function, form and arrangement, and (3) design requirements were iteratively integrated in light of a theoretical framework (Mental models, affordances, image-likeness, etc.).

As a result of review and case study, main requirements in the design of in-vehicle diagram symbols were summarized into the following four points.

Clarification of function and purpose to be displayed: It defines control, state display, and alarm, and specifies expected user behavior.

Considering users' mental models and cultural differences: We consider symbol selection or label combination according to market, generation, and common expression.

Consideration of surrounding context and placement: avoid confusion with nearby similar symbols and ensure that physical placement and directionality are consistent with interpretation.

Simplification and emphasis for immediate legibility: key features are deformed and emphasized, and excessive abstraction and decoration are avoided.

This paper presents conceptual requirements as the first report, and points out the limitation of the number of literature and products. In the future, preparation of candidate diagram symbols based on requirements and quantitative evaluation (Cross-cultural comparison and measurement under heavy load environment) of intelligibility and glass performance using test subjects will be carried out, and it will be developed to a demonstrative design guideline..