

# Art-ethnography to Analyze the Role of Sketches in Car Designing

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**Abstract.** In this study, we investigate the design process of car making at a Japanese car company. Using 161 sketches that a designer produced during the car design process, we analyze which areas of the car body and types of manipulation were in focus in each phase of the design process. This type of analysis of design sketches, named “Art-ethnography,” is useful in understanding the creative process in car design.

**Keywords:** creativity, car design, sketch, Art-ethnography

## 1 Introduction

Nowadays, Japanese car companies are very competitive on the world market. The reason for this is not only their excellent technology, but also their design quality. Although the design process has been studied in the field of architecture and graphic design (e.g., Goel, 1995; Suwa, Tversky, 1997), there have been very few studies in the field of car design, perhaps because of issues of confidentiality. Our study aims to clarify the design process of an in-house designer at a Japanese car company by analyzing the sketches produced during the design process.

Mainstream creativity studies of the design process often use non-professional subjects such as undergraduate students, and fairly artificial tasks such as designing a piece of furniture by combining given shapes in lab settings (e.g., Finke, Ward, Smith, 1992). However, some studies have used professional designers and more natural settings. For example, based on observation of the design process by professional designers and post-graduate students, Tovey, Porter, Newman (2003) pointed out the importance of form lines in automotive design sketches. Mougnot, Bouchard, Aoussat, Westerman (2008) collected interview data and experimental protocols from professional designers to investigate how inspirational information is used before generating ideas.

Our study also follows the path of examining the design process by professional designers. Like Tovey

et al. and Mougnot et al., we focus on the sketches made by a professional designer for idea generation. However, our study has the following unique features: 1) We focused on a design project conducted by a professional designer in an actual car company; 2) The data of this study were from a long-term design project which lasted more than four years.

## 2 Art-ethnography Approach

Studying the car design process in real settings requires a sensitivity to confidentiality, in addition to having a high level of technical and artistic knowledge in the domain. This constraint makes it difficult for outsiders to study the car design process using ethnographic methods such as participant observation. At the same time, designers’ autobiographical reports have low reliability as data for the study of the design process. Although such data collected by professionals contain useful information that outsiders cannot easily access, retrospective self-reports may be distorted by various biases such as wishful thinking on the part of the writer (Ericsson, Simon, 1984).

Therefore, in this study we introduce a new approach, “Art-ethnography”, which employs autoethnography as a base method, adding analyses of sketches as visual evidence (see **Fig.1**). Autoethnography is a method that combines autobiography and ethnography to explore the writer's own subjective experiences. Although it has the same biases as autobiography, combining it with objective analyses of external evidence such as sketches enables us to access the design process in real settings. We define Art-ethnography as a cognitive methodology, whereby designers themselves analyze their cognitive process using their own visual art products (i.e., sketches in this case) as data.

With a preliminary analysis of sketches that a car designer produced during an actual car design project, we describe an example of art-ethnography and consider the usefulness of this methodology.

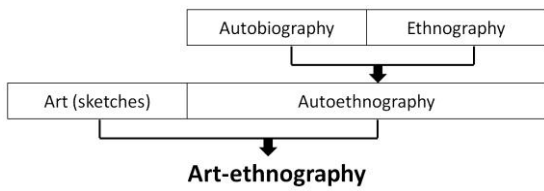


Fig. 1. Structure of Art-ethnography

### 3 Sketches

In the field of car design, projects are developed and organized collaboratively, using sketches as the main medium. Sketches have three main functions:

1. Idea generation;
2. Discussion & reflection;
3. Presentation.

Fig. 2. shows the relationship between these three functions and social phases, as defined by Fujihata (2008).

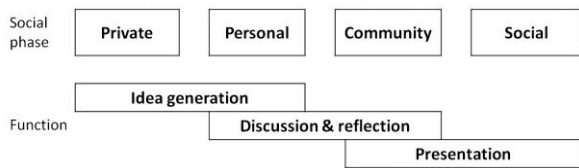


Fig. 2. Role and structure of sketches

### 4 Target Project

We focused on a Project A, in which the first author participated in as an in-house designer. Project A produced a new car, Model A, that was highly appraised, not only for creating a new exterior style but also for creating a new concept. Due to its novelty and impact, the car was awarded the Japanese Good Design Award (specifically, best award in the transportation section). The design of Model A entailed many sketches over more than four years. We analyzed 161 sketches that were created by the first author, who worked as the sub-chief in-house designer on this project. The designer ordered these sketches chronologically and classified them into 31 groups based on the view of sketches, memos of the project, and articles about Model A. Each group consisted of 1-9 sketches. Then, these groups were divided into six phases depending on the design direction and development policy.

The phases were defined according to the main concepts in each phase of Project A, and assigned names by the designer.

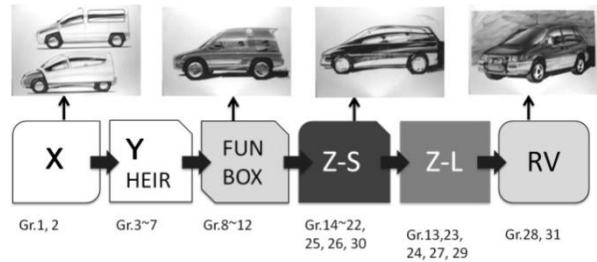


Fig. 4. The phases, their names and the numbers of the groups in each phase

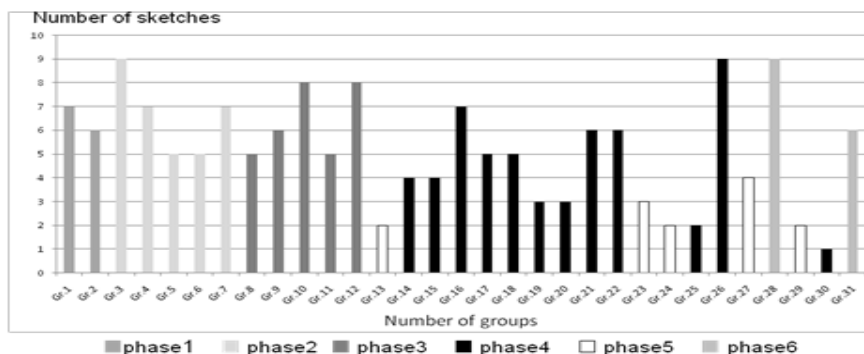


Fig. 3. Groups and phases of sketches

## 5 Visual Analysis

The core part of car design is called “styling”. The sketch is regarded as a critical tool for styling. Therefore, to investigate how ideas are developed in a car design project, sketches produced during car design are considered to be of greater value than memos or official written documents. When analyzing design sketches objectively, it is wise to pay more attention to shape than to color or shade, because car shape is the core feature of styling. Based on such ideas, we focused on two aspects in designing car shape: “areas of the car body” and “type of manipulation”. The areas of the car body indicate which area of the car body the designer was working on at a certain point, and the type of manipulation indicates what kind of manipulation was applied to that area.

In this analysis, we focus on groups 14-18 (phase 4), because the core ideas for the final design were developed in these groups.

### 5.1 Areas of the Car Body

First, the car body in the sketch was divided into six areas, as is customary in the car design community. We derived the terms for each division from Dai-Sharin, a dictionary of automotive information (Iida, 2003). This dictionary includes not only information about social and technological aspects, but also information about design aspects of cars. The design section of this dictionary was written by the editor-in-chief of “Car Styling”, an internationally acclaimed car design magazine.

- ① Front end: This area includes the bumper, front grille, headlamps etc. This is an important area for car design because this area is crucial in determining the impression of the car.
- ② Front upper: This is the area from the hood to front windshield.
- ③ Rear upper: This area includes the rear roof, rear quarter panel, and rear window. This area is important in determining the characteristics and function of the car.
- ④ Rear end: This area includes the rear combination lamp and rear bumper.
- ⑤ Side panel: This is the area from front side to rear side including the doors.
- ⑥ Fender: This is the area surrounding the front and rear wheels.

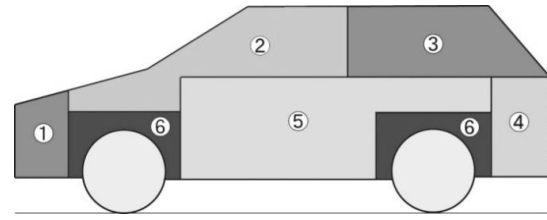


Fig. 5. Areas of the car body

### 5.2 Type of Manipulation

To capture the process of change of design elements, four types of manipulation were categorized as A to D, based on the level and nature of design manipulation used while drawing sketches (see Fig. 6).

- A. Proportion: To change the height and length of the car body.
- B. Component: To change major parts of the body shape.
- C. Sub-component: To change minor parts of the body shape.
- D. Graphic: To change the color or texture of the design elements.

The detailed procedure of this analysis was as follows. First, we identified design elements that were changed between sketches in a group. Second, we identified the areas of the car body where those elements belonged. Third, changes in elements were classified according to the types of manipulation mentioned above. These changes in design elements were marked on the sketches as shown in Fig.7., based on the areas of the car body and the types of manipulation. Then, we counted the number of each type of manipulation in each area of the car body in each group of phase 4. Thus, focusing on the two aspects of areas of the car body and type of manipulation, we were able to analyze these sketches quantitatively. We call this analysis “Pictol Analysis”.

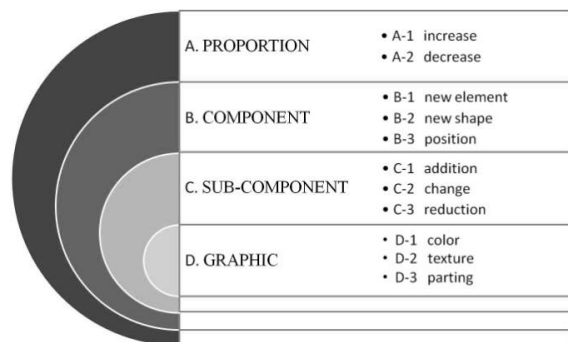
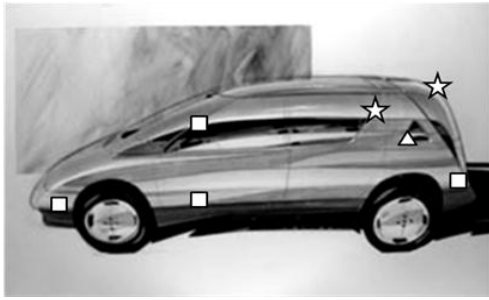


Fig. 6. Type of manipulation



**Fig. 7.** Changes in design elements  
 Note: The types of manipulation are indicated as follows:  
 ☆ = B; △ = C; □ = D.

paid attention mainly to the Rear upper area and Side panel in group 16.

Data of the element changes in five groups are presented in **Table 2**. This table indicates that the designer’s concern gradually changed from ① Front end and ② Front upper to ③ Rear upper and ⑤ Side panel. This result suggests that he formed the design concept through drawing sketches by gradually shifting the target area. It is also found that such manipulations were not conducted only in the main area of interest, but also in other areas of car body.

Thus, the design process of the designer can to some extent be captured in the Pictol analysis of sketches. In this process, the designer did not generate new ideas only through cognitive manipulations like conceptual combination. Instead, many of the new design ideas were generated through the cycle of hands-on sketch activities shown in **Fig. 8**.

## 6 Results

**Table 1.** indicates the frequency of design element changes in group 16. In other words, it shows the elements that the designer manipulated in the sketch.

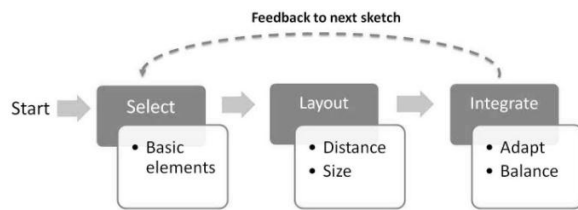
For example, **Table 1.** indicates that the designer

**Table 1.** Total of group 16 sketches

Gr.16 7 sketches	① Front end	② Front upper	③ Rear upper	④ Rear end	⑤ Side panel	⑥ Fender	Total
A. PROPORTION			○				<b>1</b>
B. COMPONENT	☆☆	☆☆☆	☆☆☆ ☆☆☆ ☆		☆☆☆ ☆☆☆	☆	<b>19</b>
C. SUB-COMPONENT	△		△△	△	△		<b>5</b>
D. GRAPHIC	□□□	□□	□	□□	□□□	□	<b>12</b>
<b>Total</b>	<b>6</b>	<b>5</b>	<b>11</b>	<b>3</b>	<b>10</b>	<b>2</b>	<b>37</b>

**Table 2.** Total number of element changes

	① Front end	② Front upper	③ Rear upper	④ Rear end	⑤ Side panel	⑥ Fender	Total
Gr. 14 (4)	<b>6</b>	<b>11</b>	4	2	3	3	<b>29</b>
Gr. 15 (4)	<b>12</b>	<b>9</b>	5	4	8	2	<b>40</b>
Gr. 16 (7)	6	5	<b>11</b>	3	<b>10</b>	2	<b>37</b>
Gr. 17 (5)	3	3	<b>10</b>	<b>5</b>	4	2	<b>27</b>
Gr. 18 (5)	6	6	<b>10</b>	6	<b>10</b>	4	<b>42</b>
All total	33	34	<b>40</b>	20	<b>35</b>	13	<b>175</b>



**Fig. 8.** Flow of sketching

## 7 Discussion

Through an analysis of the sketches, this study has attempted to capture the car design process that occurs in a real car company. To do so, we have proposed a new type of approach, called Art-ethnography, and a new type of analysis, called Pictol Analysis. Focusing on areas of the car body and type of manipulation, we have tried to capture the design process objectively. Since this study is still in a preliminary phase, we do not have any clear results from which to draw strong conclusions to discuss in relation to findings from previous studies in this field. However, this type of analysis produces promising results in capturing the car design process. Since this is the first step in this

approach, it goes without saying that further study is needed to demonstrate the validity of our approach.

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