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DISCOVERING THE MEANING OF FORM BY EXPLODED SKETCHING

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ABSTRACT
The means of the automotive stylist to express a unique brand identity through automotive form, the main objective of automotive styling, have diminished. Platforms and technologies, formerly brand owned and specific to a brand's identity and styling, have to be shared among the many, as do market segments and geographical domains. This increases the responsibility of, and the pressure on, styling to perform on a strategic level.
In order to allow automotive stylists to negotiate form with other disciplines on that strategic level, the dialogue on form must extend beyond the mere tacit knowledge vocabulary. In our automotive styling research, embedded in our education program, management models and methods are being developed to frame and facilitate tacit knowledge and achieve the aforementioned objective.
These management tools must contain familiar elements for both disciplines that are involved in negotiations, i.e. styling and engineering. The 'styling'-side of these management tools assesses automotive form through a form hierarchy. The application thereof requires a methodical way of explorative sketching.
This explorative sketching, with the aim to detect a leitmotif in automotive form that represents brand identity, has been developed over two years in an education environment. Results suggest that specific sketching methods are appropriate for each level of the form hierarchy, a combination of views that develop into explorative sketching, and a connotation dialogue to be combined with sketches.

Keywords: Design education, strategic design, tacit knowledge, automotive styling, sketching.

1 INTRODUCTION

Automotive brand identities are generally embedded in 'brand owned' technologies that determine automotive form [1], [2]. Sharing technologies and systems between OEMs, forces stylists to share form characteristics such as proportions, overhang and stance. Those characteristics are than largely eliminated from the stylist's vocabulary and means to create distinctive designs [3]. Additionally, car companies are invading each other's historical as well as geographical domains. Thus, the stylist has to compete with more cars and fewer means than ever before, to create a distinguishing car [4]. To maintain visual brand identity, styling must be framed strategically [5].
Strategic styling is a relatively young topic. In automotive even more so than in other design disciplines because the profession's somewhat mythical image has been a threshold in adapting to new project, product, and business paradigms [6]. Within the aforementioned rapidly changing context, the automotive styling process itself has barely changed in the first century of the automobile. That is, the argument on form takes place around a number of consecutive manifestations of the design (sketches, scale models, full scale models…) and is largely based on tacit knowledge. There is no common frame of reference in place that links styling to other disciplines [7].
In this context the term 'automotive styling' is the integral form giving of cars, encompassing package design and negotiating engineering constraints such as platform related dimensions, aerodynamics etc. The term 'automotive design' is often used to avoid 'styling' because of its incorrect superficial connotation [8]. Nevertheless 'styling' is historically more appropriate because it differentiates from other design activities. In this paper the term is used for clarity.
This paper explains the research into explorative sketching as a method to identify the meaning of automotive form, i.e. the identification of a leitmotif as the expression of brand identity. Explorative

sketching supports the use of management tools, specifically the Automotive Form Hierarchy, that facilitate the negotiations between styling and other, business or engineering focused disciplines beyond the mere tacit argumentation on form. [9].

2 RESEARCH CONTEXT

2.1 Automotive From Hierarchy

The Automotive Form Hierarchy, Figure 1, has been designed to able those involved in the negotiations to assess automotive form in a structured manner. A management model, aiming to bridge a gap between disciplines, must contain familiar elements for each of those disciplines, a common vocabulary [7], [10]. The right side of the hierarchy distinguishes five levels on which automotive form may be analyzed. These levels are referred to throughout this paper. Further elements of the management model are outside the scope of this paper.

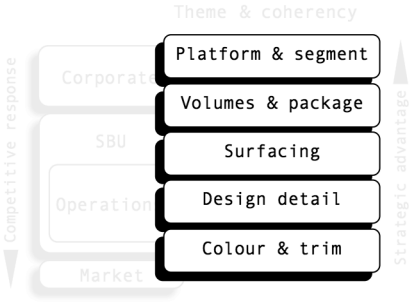

Figure 1. Automotive Form Hierarchy

2.2 Education

Our research program on automotive styling, specifically strategic styling, is embedded in our design education with students of various design disciplines. Liem et al classified the respondents in their study in the field of automotive form into four categories from Novice to Expert, in which they classified students to be in the same category as practitioners with less than five years working experience in industry [8]. Karlajanen executed his experiments on methods for the analysis of products, with regard to their brand typicality, in an educational environment as well. Within limitations, students may be considered a valid sample in this [11].

In our Strategic Automotive styling course, management tools are being developed to bridge the gap between all disciplines that are involved in the (automotive) design process [9]. To apply those tools in collaborative processes, design disciplines must develop mutual understanding of the meaning of form, and acquire skills to methodically unveil why and how a product expresses its desired character, or fails to do so. This understanding is developed through ‘explorative sketching’.

3 RESEARCH

Explorative sketching, to identify a car’s leitmotif by use of the Automotive Form Hierarchy, has developed over a number of years through sketching exercises in class. For the last two years, this explorative sketching has been researched and developed in a structured manner, of which this paper presents the outcome.

The data set consists of the collected sketchbooks of 61 students (28 in 2014 and 33 in 2015) as well as their personal written evaluations. Each sketchbook contains the sketches of up to 34 sketching exercises. In total around 900 sketches have been assessed. Sketchbooks are in A3 format. On a smaller format people tend to draw from their wrist instead of with their whole arm from the shoulder, which makes sketching convulsive. Furthermore a smaller format is inappropriate for objects as large as cars [12], even more so if one wishes to sketch multiple views on a single sheet.

Sketchbooks have been assessed in two reviews. In the first assessment each exercise has been reviewed throughout all the sketchbooks, to evaluate the set-up of each particular exercise. In the second assessment, each sketchbook is reviewed in its entirety to evaluate student progress throughout the course, both in terms of sketching progress as in understanding. In some cases, students have been interviewed to verify observational findings.

Continuous observations in class during the exercises are supporting the assessment of the sketchbooks. Improvements as explained in the next paragraphs have, as much as possible, been implemented directly in class, so that students may benefit and the effect may be tested immediately.
Although this process has a continuous character, results are being presented per year for clarity. In 2014 the main focus has been on professionalizing the exercises in their own right. With adapted exercises, based on those results, the research focus extended to actual form research in 2015.
Sketching exercises consist of sketching a car from projected images. In early lectures of the course the exercises are to sketch a projected car in its entirety, searching for a 'leitmotif', which may be in every styling parameter of the Form Hierarchy. As the course progresses students are taught to 'explode' their sketches and draw a car's characteristics per level of the Form Hierarchy separately.

3.1 First year results

The first challenge each year, is to let students surpass their ***fear of sketching*** inaccurately. Having the teachers sketch abundant examples in class, on the board as well as in their sketchbooks, lowers the threshold. They need to experience that sketching in a caricature fashion, deliberately or mistakenly, brings distinctive features better forward, than in a drawing as accurate as possible.
Representative quotes from student's personal evaluations: *"I was afraid of drawing. I know I am not good at making beautiful drawings. In this course however, this was not necessary. By making almost cartoonish, caricature drawings, I could express my thought about the form language of most cars"* and *"It is nice how, in this course, the focus is not on sketching quality, but on how you can analyze form while sketching."*
Over time, a part of the students actually develop the skill to sketch other views than merely the ones projected in class. This is true mostly observed when only three quarter views are projected. Students will distil a side view form that to investigate a car's ***silhouette***. The silhouette reveals a number of important features of a car (i.e. volume arrangement, angles between body and greenhouse, front and rear overhang) and is therefore missed if not presented.
Initially, the projected images for exercises would be a single view of a car, which may wrongly suggest that that particular view depicts the car's leitmotif best. Students have, in their evaluations, regularly stressed the importance of having a silhouette; bust also stated that a single view is not enough: *"What we did a lot until now, draw the side view (e.g. Saab) but than we know where the leitmotiv is", "You get lines and overhang, but no surfacing. So you always need multiple views" and "Doesn't have to be the same view as projected. And please project multiple views."* Considering that a leitmotif may be applied in any level of the form hierarchy, the explorative challenge is best served by a composition of ***two or three views,*** to distinguish a leitmotiv, Figure 2.

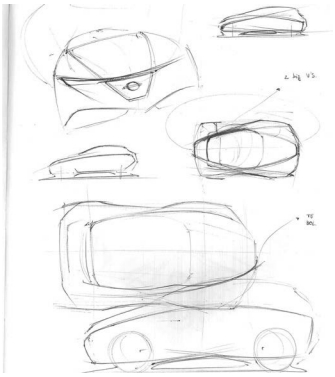

Figure 2. Multiple views in automotive form analyses

In the assessment of sketchbooks, one of the assessors pointed out perceived faults in student work on a round feature (the headlight of a car), which students wrongly drew in a pointy manner. A review of the exercise image however, showed that the student' sketches were correct. The reviewer was biased because of his familiarity with the car. Such a situation might easily arise in negotiations between experts and other disciplines too. Multiple views are crucial to prevent ***visual bias***.
As confirmed by earlier student quotes, the use of ***caricatures*** is helpful in form analyses to identify distinctive features, Figure 3.

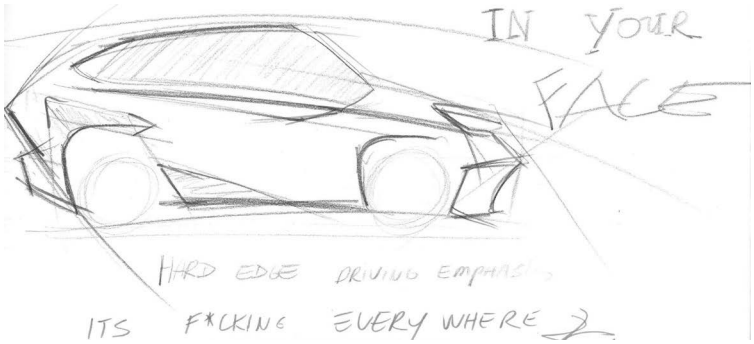

Figure 3. Form feature caricaturized

In the course of 2014 we have started to stimulate students to ***add explanatory notes and arrows*** to their sketches, to explain their findings. This makes findings specific and stimulates active thinking about the purpose of the sketch and questioning the appropriate level of detail. I.e. once the leitmotif has been convincingly identified, how important is it to finish the sketch?
On exercise images we would emphasize specific form features, e.g. important curves, a section line or detailing, with a projected overlay. This highlighting, Figure 4, is adopted by students as well.

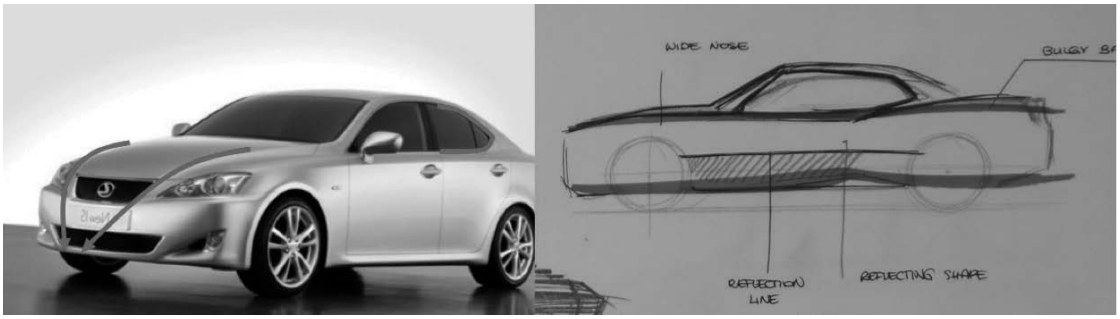

Figure 4. Highlights in classroom example, and applied by a student

3.2 Second year results

The aforementioned first year findings were applied in the design of the exercises for the second year and proved valuable. Although the second year started with an equally 'pristine' group of new students, the focus in their sketching shifted successfully from sketching issues in their own right, to its intended purpose; searching for meaning of form, specifically the identification of a visual leitmotif. This conclusion surfaces from the sketchbooks (Figure 5: analyses conclusion in sketches), as well from the student evaluations: *"I also enjoyed the explorative sketching assignment during the lectures, they helped me to think of sketching as a tool to analyze"* and *"Moreover the quick sketching exercises were supportive for improving my analytic observation skills, such as identifying a car's characteristic essence. As a result I could develop a better understanding for the Why and How of leitmotifs"*.

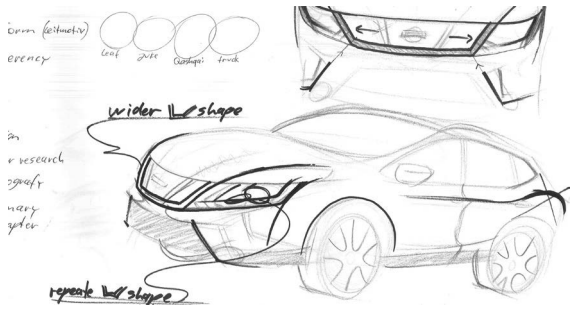

Figure 5. Form analyses in sketches

3.2.1 Exploded styling sketch

In 2015 the exploded styling sketch starts to develop in student work of a minority number of students. An exploded view is a term that generally refers to a schematic or technical drawing of an object, that shows the relationship, or order of assembly of its various parts, by showing those components slightly separated by distance. In a exploded styling sketch styling features are visually separated as they are in the Form Hierarchy.

Considering the student's additional notes and highlight in the example in Figure 6, the written findings are correct. The car's visual leitmotiv is indeed a pyramid shape, emphasized by its side graphics, depicted in the car's side view.

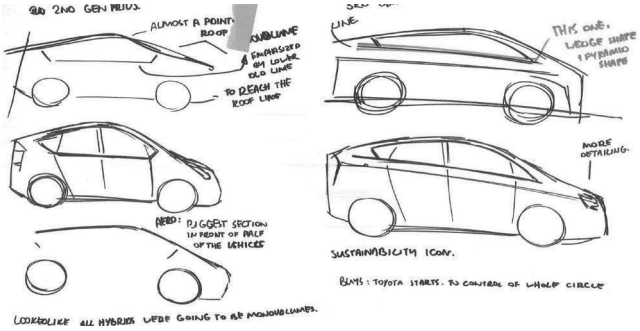

Figure 6. Exploded sketch of form properties; silhouette, daylight, character lines

These findings are also incomplete. A visual leitmotiv is a guiding form principle that directs all visual parameters in a whole. Surfacing, which is in this example one of those resulting parameters, is not visualized because the explosion is limited to side views only. This and other examples indicate that a car's surface treatment may be depicted differently than its silhouette and volume. In a technical exploded view all components are aligned equally so that the assembly is understood. For a styling exploded sketch though, different views emerge as being appropriate to explain visual leitmotifs at different levels of the Automotive Form Hierarchy. This is a main outcome of the second year, during which a common practice starts to emerge, as follows:

- To visualize a leitmotif on platform level, which encompasses all dimensions in the horizontal plane, a 2D sketch of the top view is suggested.
- To visualize a leitmotif in the volume arrangement, which encompasses dimensions in the vertical plane, a 2D sketch of the silhouette with additional curves.
- To visualize a leitmotif on Surfacing, which is a general form approach that may not be specifically allocated, a sequence of (vertical) sections of horizontal character lines in 3D. Horizontal character lines that vary in direction must be sketched as well. Both are shown in Figure 7.
- To visualize a leitmotif on Detailing, which will contain elements around the vehicle, a compilation of connected detail sketches in 2D or 3D.
- A Colour & Trim leitmotiv is generally found in contrasting surfaces, e.g. two-tone, and best visualized with abstract high contrast colouring of adjacent surfaces in 2D or 3D.

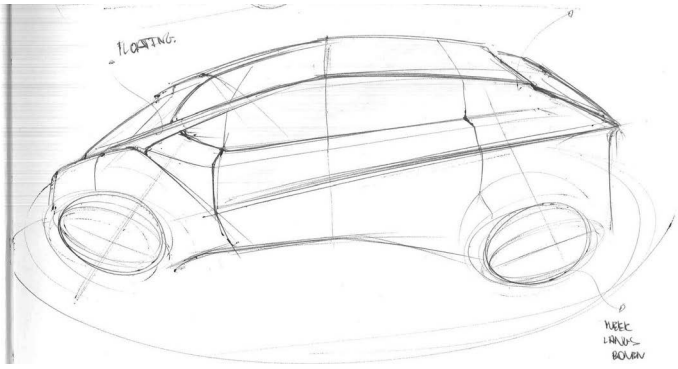

Figure 7. Surfacing sketched though sections and character line

4 FURTHER RESEARCH & LIMITATIONS

In the sketching of students an inventory on ***the meaning of form*** starts to emerge. Specific styling features are perceived as specific characters. Although the results are yet too thin and sporadic to regard this as a valid research outcome, it suggests potential. In further research the building of a form library is being investigated, expanded with the time dimension because the meaning of form changes. Such a form library would consist of (combinations of) form in combination with the terms that are perceived to apply, a Form Vocabulary.

Equally too limited to present as a research outcome, some students suggested to develop exercises to ***sketch projected cars in a modified way***, so that the perceived character changes: *"How to make this car more feminine or dominant"* and *"with this course I learnt how to iterate designs by modifying specific details, to reach a desired character"*

This builds upon earlier research into the meaning of automotive form in which isolated features have been altered on photographs of cars (in software e.g. PhotoShop) to investigate how that would alter the perception of a car's meaning [12].

The Automotive Form Hierarchy was designed for negotiations with other disciplines on automotive styling. Various students have suggested in their written evaluations that the hierarchy, as a principle, might be altered ***to serve in negotiations on other products*** as well: *"Would love to utilize this tool for non-automotive applications in the future as well"* and *"The models, for example the form hierarchy, are helpful to apply to coming projects. I am currently talking to a clothing company to do a graduation assignment there and I believe these models can also be applied when designing for them"*

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