Analysis of Precedent Designs: Competitive Analysis Meets Genre Analysis

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ABSTRACT
Designers need to survey the competition and analyze precedent designs, but methods for that purpose have not been evaluated in earlier research. This paper makes a comparative evaluation between competitive analysis and genre analysis. A randomized between-group experiment was conducted where graphic design students were conducted one of the two analysis methods. There were 13 students in one group and 16 in the other. The results show that genre analysis produced more detailed descriptions of precedent designs, but its process was more difficult to understand. It is concluded that genre analysis can be integrated into competitive analysis, to make use of the strengths of both methods in the analysis of precedents.

Author Keywords
Analysis of precedents, Genre analysis, Competitive analysis, Interaction design.

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION
It is well known that designers learn from existing examples and precedent designs by surveying competing designs and seeking inspiration [23, 41, 46, 47, 48]. Experienced designers can also abstract from the specific cases to see design principles, patterns and schemes that are instantiated repeatedly [4, 5, 11, 27, 31]. Competitive analysis helps designers position their design in relation to the landscape of other offerings. Numerous papers have reported on using competitive analysis in interaction design, but none of them provide any details on procedures of analysis [2, 3, 7, 9, 10, 16, 24, 25, 38, 44]. This paper will present two procedures for conducting analysis of precedent designs. The first procedure builds on a method presented by Brown [8] and the second procedure builds on genre analysis as it has been conceived in literature and film studies [26, 45]. The procedures are then put to test with students, and finally further developments of them are discussed.

Competitive Analysis
Brown [8] has given a practical account of how competitive analysis can be conducted in web design. He uses the example of pet-related websites that can be compared on their range of products, the design of search boxes, navigation, contact information, and shopping functions. The basic idea of competitive analysis is to line up competitors side-by-side and highlight similarities and differences on selected points of comparisons. This will disclose expectations from users who are used to other sites, and best practices in everything from interface design to offered features. Inconsistencies may indicate that some sites have innovative solutions, or that industry has not settled on any single approach. The result from competitive analysis is a strategy document that helps define the general direction for design without defining the design itself. Surveying the competition is, according to Brown, a good way to get ideas and establish a baseline.

Procedure for Competitive Analysis
A competitive analysis can be broad and give a feel for the product landscape and identify best practices, or it can be narrow and identify how competitors have solved a particular design problem. The following steps are involved in a competitive analysis according to Brown: (1) Identify and describe the purpose of the analysis; (2) set up the competitive framework; (3) gather and present data; and (4) document the conclusions.

1. Identify and describe the purpose of the analysis. A competitive analysis basically consists of two dimensions: a number of competitors and a set of criteria for comparison. This can often be visualized using a simple table where the competitors can be compared side-by-side and similarities and differences be highlighted. The difficult part of a competitive analysis is deciding what set of competitors to compare and what criteria of comparison to use. It is good to be clear on the purpose of the analysis to facilitate these decisions.

2. Set up the competitive framework. The framework, which consists of the two dimensions competitors and criteria for comparison, is often set up in a table. The competitors run along the top row and the criteria along the leftmost column. The criteria for comparison may be specific or general. Specific criteria for an online shop could be "Additional Item Categories", "Account Management Links", and "Offline Shopping Links". A more general criterion for comparison could be "Home Page Navigation". Another way to set up a competitive framework is to use a two-by-two, where competitors are placed along two dimensions. The criteria for comparison tends in such frameworks to be general since the number of criteria only are two. This type of visualization can be useful for identifying gaps in the product landscape that your product can fill. A third way to do a framework is to make a series of small images of the competitors that, for example, visualize their page layouts.

Very deep or very broad analyses risk becoming difficult to read. There are two ways to manage this: one way is to structure the document by criteria for comparison. This provides a collection of smaller competitions. You may, for example, compare a handful of sites focusing five groups of criteria for comparison: home page design, interior page design, search functionality, features offered, and navigation. This kind of organization makes it easy to identify the best competitors for a specific criterion and across all criteria, but it makes it difficult to get an overall picture of the user experience for each competitor.

The other way to manage larger analyses is to structure the document by competitor. That means there is one section for each competitor which gives each and one of them a profile. Every profile describes the criteria for comparison. This makes it easy to get an overview picture of the user experience for each competitor, but it makes it harder to compare the competitors with each other.

3. Gather and present data. When the framework is completed the analyst fills it with data from the analysis. The purpose of the analysis is to describe similarities and differences between products, and it is therefore important to find ways of highlighting them in the presentation of data. The data can be represented in different ways, with different fidelity. Yes/No values are good for comparing if competitors have or does not have a set of features. The drawback is that more subtle differences are lost. Another

way is to score the competitors on every criterion, much like a restaurant review based on criteria like the quality of the food, the ambience, the service, and the expense. For such comparisons, you need to give an account of what, for instance, a high score on the service means. Descriptions is the most common form of data in competitive analyses and they can be explicit on how competitors stack up against each other, without risking potentially skewed numbers.

4. Document the conclusions. Data needs to be interpreted in relation to the client and/or the project at hand. The competitive analysis should project a direction for the future design work by stipulating conclusions based on data. Referring to clear design problems and a narrow analysis make it easier to draw explicit conclusions. If the purpose instead is to give a broad analysis and an overview of the product landscape, the analysis should provide a handful of consequences for design.

Genre Analysis
We will in this paper connect competitive analysis to the notion of genres. In, for example, literature and film studies it is common to use genre analysis in comparative analyses. We believe that this also may be a worthwhile approach in competitive analysis for interaction design. A common coding scheme in genre analysis consists of three points of comparison: form, content and purpose [45]. Think of a telephone bill, which can be described according to its layout (the form) that displays the phone calls and their respective cost (the content), to inform the recipient of how much to pay, when to pay, and what exactly it is that he or she is paying for (the purpose).

A genre analysis describes the common features and differences between many similar objects, and sometimes how they change over time. Genre theory suggests that recurring forms of communication (e.g. the telephone bill) and interaction (e.g. how the telephone bill usually is delivered and paid) help participants understand the purpose of the interaction. The recurring and familiar forms also create expectations on form, content, and purpose of the interaction, and on the actors involved (e.g. for the telephone bill, that the sender is actually the telephone company and that the recipient is the one responsible for paying) [12].

Genres are central to human cognition, and are based on the human ability to generalize common aspects of recurring situations and objects [35, 36, 37]. For people in everyday situations, genres help to find more of something one has experienced before, and to recognize what kind of situation one is in, for instance an argumentation or a negotiation [1, 12]. It is though, not obvious that more of the same means good design. For a design to be, for example, enchanting it must also evoke a sense of wonder at the newness and unexpectedness of the design [33]. Competitive analysis and genre analysis do, however, not drive design. They only provide a benchmark or basic understanding of the design domain at hand.

For different genres of communication or interaction, people have expectations on the purpose, on the actors involved, and on the form of the genre object. If the form changes, for instance, by someone starting to fight during a negotiation, or by using inappropriate language, the deviation from the genre of negotiations re-defines the situation. Also, if the actors are seen as inappropriate, for instance a newspaper that apparently is not produced by a newspaper agency, then that deviation from the genre norm also re-defines the situation [12]. People draw upon genre rules, to re-create new situations according to their experiences and expectations [49]. Deviations from the norm can also change the genre, by altering the rules. Thus, genre is not just about repetition, but also about changes. Changes to a genre can divide it into sub-genres, appropriate for somewhat different purposes. Genres analysis can accordingly be used to describe and categorize phenomena into genres, sub-genres, and mix-genres, and to analyze what genre is appropriate for different ends. This has for instance been done for Swedish municipality websites [15]. Genre analysis can also be used to describe changes to a genre over time, which for instance has been done on cyber genres [43], on memos [49], and on web design styles [40]. Some designs are more generic, or more central to the genre, which has been shown in an analysis of personal homepages [13], and cultural aspects have also in earlier research been used as a basis for comparison [42]. Genre analysis has also been used to understand why some designs are better than other designs, by comparing the most successful genre variations to the less successful genre variations. Such analyses have been done on academic texts [45] and on online newspapers [21, 22].

On a general level, different genre analyses largely share the same coding scheme, using form, content and purpose as points of comparison. There are, however, variations. Devitt [12], for instance, describes the characteristics of genres using a coding scheme consisting of a) characteristics of the communicators, b) situation with social and personal motives, c) form and content of communication. Swales [45] uses purpose, content, positioning, and form. Although some analysts use these abstract schemes, it is common to be more detailed. For instance, more detailed points of comparison for film analysis could be setting, characters, narrative, iconography and style [26]. For computer games a detailed set of points of comparison could instead be visual style, cut scenes, interface metaphor, pace, and control schemes [50]. Analyses made in information systems often concern digital media, its form in terms of positioning on screens, its contents in terms of services and information, and the purposes that the information system can fill for different actors [20, 32].

The points of comparison we use in our approach have been developed over a few years. We have embarked from the notions of form, content and purpose, but have realized that they need to be interpreted somewhat differently in the area of interaction design. In particular, when discussing aesthetics of interactive products and services we have to include not only characteristics of the artefact and user experiences, but also the characteristics of the interaction that takes place between artefact and user, and between users mediated by the artefact [28].

Procedure for Genre Analysis
The following description of how to conduct a genre analysis builds on our earlier work [14, 15, 19, 21, 22, 29, 30, 6], but is in this paper more comprehensively described. The following steps are involved: (1) Map out the contents of the products, what elements the contents consist of, and what the elements consist of; (2) identify the purposes of the whole products and the purposes of the elements; (3) describe the form of the whole product and of its elements; and (4) identify shared characteristics and differences between the products.

1. Map out the contents of the products, what elements the contents consist of, and what the elements consist of. The first step is to identify the most common elements of a product in the genre. This will provide a repertoire of design elements that can be used to compose genre typical products and to pinpoint characteristics that are unique to some products. Every design element can in turn be described in terms of its elements. This hierarchical breakdown will end at some level and the atoms of the design elements are, for example, lines, textures or specific behaviors. The contents of a product also have a structure: There are different ways to label elements and different ways to organize them in different products. It may also be relevant to analyze what design elements that appear together.

2. Identify the purposes of the whole product and the purposes of the elements. The next step is to find what purpose the genre as a whole fulfils, if particular products has partly other purposes (and may form sub-genres), and what different design elements are used for. You may speculate about the purpose, but the analysis needs to be complemented by interviews or surveys with users and producers in order to be really trustworthy. Such studies may show how important every element is to fulfill different stakeholders' overarching motive. The composition of form, content and purpose of a product must be in line with the context in which it will be used. This is particularly important, when it comes to different stakeholders' and users' motives and experiences. Motives of different actors should match the purpose of the genre in order for the genre chosen to be appropriate. To give an example, a customer in an online store may want a specific item at a low price, while the owner of the store may want to sell as many items as possible to the same customer. The purpose of the online store should meet both these motives in order to be said to have an appropriate design. Experienced qualities like orientation, satisfaction, confusion or flow in the interaction may make the motives

easier or more difficult to achieve. It can, for example, be difficult for a user to reach the motive 'shop food quickly' in a confusing store.

3. Describe the form of the whole product and of its elements. When discussing form elements in interaction design we need to consider movement, space, time, appearance, texture, and sound [39].

The first step of describing the form is to identify the positions of the design elements. The first form aspect is therefore space. A virtual space can also be described as a network of nodes where the user navigates using links. The concept of users' space for action can be used to indicate actions that are close to hand and actions that are further away. Different kinds of spaces (physical, screen based, virtual) can also be mixed and combined. The spatial aspects of the form can be said to form a layout.

When the layout has been described, the following step is to describe the second form aspect: movement. All interaction involves movement. It is about the movement of people and products, and how products and their design elements are transformed. Some elements are static, while other can change dynamically independently of the user's actions. They can be passive, reactive interactive or proactive [17, 18]. Proactive elements perform actions based on predictions about the future. When users interact with an element its state also changes. An example is how the state of a web site changes for each step from page to page that the user make. This movement forms a history of where the user has been and where he or she is headed. The movement can be initiated by the user, the system, or be continuous. Continuous movement requires steering (as for example in a snowboard game where you ride down the slope). Movement is also effective for catching people's attention.

A third form aspect is the appearance of the product and its design elements. It gives clues to the behavior of the elements and how you interact with them. The appearance structures the interaction by presenting opportunities for interaction (i.e. affordances, [34]): If you look upon a door handle you may perceive that you can pull it or push it depending on your earlier interaction with the world. The presented structure may be static insofar that the same opportunities for interaction always are presented in the same way, or the opportunities for interaction may change continuously. A door handle cannot change its appearance but digital products can change their appearance completely from one moment to the next. Appearance also communicates emotional content.

A fourth form aspect is the texture of the product or design element. It includes how a surface feels and looks. Just like appearance it communicates opportunities for interaction and emotional content. Other physical properties like weight also affect experienced qualities [31].

A fifth form aspect is the sound that a product or design element has. Sound catches people's attention, carries emotional content and provides an ambience.

4. Identify shared characteristics and differences between the products. Comparisons between the products are made by placing the analyses side-by-side and searching for shared characteristics and differences in terms of form, content and purpose of the products as a whole and of the design elements. Questions to ask include: What characteristics are necessary for a user to recognize the product as belonging to the genre? What characteristics are necessary for a user to know what to do with a product in this genre? What are the consequences of the variations in the genre for how the products are experienced and how they can meet peoples' motives in different situations? Are there characteristics that make any product better adapted to various motives, experiences and situations? Are there mix-genres or sub-genres that meet partly different purposes and give partly different experiences? If so, what are the characteristics that differentiate the mix-genres or sub-genres?

Research Problem
Our practical experience of using genre analysis in interaction design research and education has indicated to us that it facilitates an awareness of the details in a design. The question for this study is whether this intuition is correct. Competitive analysis in Brown's version may be equally effective. The aim is also to investigate what benefits and difficulties design students experience in competitive analysis and genre analysis.

METHOD
A class of second-year graphic design and communication students (average age 23 years, 32% male and 62% female) were randomized into two groups to investigate if there is any difference in the level of detail between design descriptions produced using competitive analysis and descriptions produced using genre analysis. One group was assigned to do a genre analysis and the other group was assigned to do a competitive analysis. They had recently started on their first course in interaction design, after a year of graphic design studies. They were given written instructions in accordance with the earlier described procedures for the two methods. The assignment was to analyze and compare the start page, and the navigation to a specific movie using four web-TV applications (SVT Play, TV4 Play, TV3 Play and Reuters Video). They were told that they would later use their analysis as a pre-study for the design of a mobile web-TV application. They had one week to complete the assignment.

The alternative hypothesis was that there would be a difference in level of detail between the genre analysis and the competitive analysis. The null hypothesis was that there would be no difference. One could argue that a one-directional hypothesis should be used given the literature

review and our previous work, but this would increase the risk of a type I error (rejecting a true null hypothesis).

The level of detail was operationalized as the number of observed features, where a feature was defined as a design element, or a description of a design element, alternatively an experience of a design element or the design in its entirety.

13 completed genre analyses (3 male and 10 female) and 16 competitive analyses (5 male and 11 female) were handed in. Two uncompleted genre analyses were also handed in, but were not included in this study. The Mann-Whitney (U-test), which is a non-parametric test for independent samples, was chosen since the assumptions underlying the t-test (normality and homogeneity of variance) could not be met.

The participants were, after the assignment, grouped in pairs or groups of three, to discuss what they had done and seen in their analyses. They were also instructed to discuss benefits and drawbacks of the methods, and what was easy and difficult in using them. Finally, a joint discussion of

Genre Analysis		Competitive Analysis	
Benefit	*Difficulty*	*Benefit*	*Difficulty*
Gives interesting details Provides generally applicable criteria	Unclear procedure Difficult to know where to start and what to look for Difficult to know when to stop	Easy to understand procedure Gives broad picture	Difficult to set up criteria Uncertain what you miss when you use the criteria you have set up

Table 1. Results from group discussion on benefits and difficulties of methods for design descriptions.

their experiences and reflections was held. That discussion was documented by taking notes that subsequently were sorted into categories based on benefits and drawbacks.

RESULTS

The median for the genre analyses was 324 features, and for the competitive analyses it was 214,5 features. The collected data is presented in Table 1. The study showed that there was a significant difference, to the advantage of the genre analysis, between the two methods (Mann-Whitney U(13, 16) = 63, p < 0.05, two tailed).

The group discussion with the participants after the assignment provided insights to strengths and weaknesses of the methods. These results are summarized in Table 2.

The participants reported that they were unclear about how they would use the information in their future design of the mobile web-TV application. They thought it would have been easier to focus their description if they had more insight into that project.

They were also asked to reflect on what would have happened if they had not been given any procedure and only the assignment to analyze precedents and competitors to get inspiration for their design. They answered that it would not had been as thorough and that there would had been a risk that they would only have clicked and played around. One participant thought that would have been better since he/she then only would collect all the good things and annoyances from different sites to know what to build on and what to avoid.

Genre Analysis (Group 1, n1 = 13)		Competitive Analysis (Group 2, n2 = 16)	
Number of features	*Rank*	*Number of features*	*Rank*
138	3	102	1
160	7	125	2
168	9	146	4
194	11	147	5
256	16	159	6
271	17	166	8
324	19	177	10
325	20	202	12
370	25	227	13
420	26	229	14
430	27.5	239	15
430	27.5	283	18
576	28	327	21
		338	22
		351	23
		360	24
R1 =	236	R2 =	198
Median for Group 1 =		324	
Median for Group 2 =		214.5	
Median for both groups combined =		269.25	

Table 2. Data on the level of detail in design descriptions.

Looking at what the participants actually wrote about in their analyses we can see that the genre analyses were in line with the framework given to them to follow. This means that they reported the elements that the web sites contained, and described their form and purposes. The competitive analyses varied more in the their focus, and could for example highlight more technical aspects and did

more often line up features that were either present or not present among the competitors. They were also less exhaustive on form aspects.

DISCUSSION
The results show that it is likely that genre analysis provides more detailed descriptions than competitive analysis using Brown's [8] procedure. There were two methodological issues in the study. Firstly, it was difficult to decide what should count as a feature. Secondly, there were repetitions of the same feature in every description. These potential sources for error are, however, assumed to be evenly distributed in the genre analyses and the competitive analyses.

A plausible explanation to the higher level of detail in the genre analysis is that it offers points for comparison in an observation protocol (i.e. form, content and purpose), and that the analysis is hierarchically conducted. Such a framework is completely lacking in the competitive analyses. This means that the product in its entirety, its elements, and the elements of the elements, are analyzed in the genre analysis. This also means that the analysis may continue ad infinitum, which must be considered a risk.

The advantage of the competitive analysis in Browns version is that the instructions are easy to understand, and the importance of the purpose as a delimiter of the analysis is stressed. It can, in a procedure for analysis of precedents, be beneficial to merge the two methods.

Procedure for Analysis of Precedents
The genre analysis can in fact be integrated with a competitive analysis as in the procedure described below. This will not make the genre analysis any simpler to perform, but it will provide a context and purpose, which can make it easier to delimit the genre analysis.

1. Identify and describe the purpose of the analysis (step 1 of competitive analysis). Decide also what usage task to analyze to limit your analysis (e.g. 'go from start page to specific movie clip').

2. Set up the competitive framework by placing the competing products side by side, and analyzing their form, content, and purpose:

   a. Map out the contents of the products, what elements the contents consist of, and what the elements consist of (step 1 of genre analysis).

   b. Identify the purposes of the product and the purposes of its elements (step 2 of genre analysis).

   c. Describe the form of the whole product and of its elements (step 3 of genre analysis).

   d. Identify shared characteristics and differences between the products (step 4 of genre analysis).

3. Gather and present data (step 3 of competitive analysis).

4. Document the conclusions (step 4 of competitive analysis).

This procedure needs to be iteratively developed and resulting descriptions of precedent designs as well as impacts on the design process need to be evaluated. This was a study with second year graphic design students, and future research also needs to test the method with experienced design students and professional designers.

Conclusion
Interaction designers need to conduct analysis of precedent designs, but methods for that purpose have not been evaluated in earlier research. The results of this study indicate that genre analysis produces more detailed descriptions of precedent designs than competitive analysis does, but it is also more difficult to understand. Genre analysis can however be integrated with competitive analysis to make use of the strengths of both methods.

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