

# Beyond Usability: A Methodology to Evaluate the Affective Experience of Interaction with E-Commerce Websites

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## ABSTRACT

Given the popularity of usability testing, why do people still feel uncomfortable interacting with websites? Could it be because usability testing does not address the user experience but rather tends to deal with efficiency and navigation but seldom with experience? The current implementation of usability research heavily relies on quantitative analysis when the nature of the issue is qualitative. Few studies have adequate scope to include both quantitative and qualitative analysis, while virtually no current Usability Evaluation Method (UEM) incorporates a qualitative component.

Activity theory describes several elements involved in human activity. By incorporating Activity Theory with quantitative and qualitative measures of user experience, the designer will be better able to assess the affective impact of a website design.

The purpose of this paper is to introduce the theory and foundational methodology used to complete the study.

## Author Keywords

Activity theory, usability, usability testing methodology, usability evaluation, qualitative data, flow, rubric

## INTRODUCTION

Emotions are fundamental in enriching any system interaction [1] and usability testing has become commonplace in the design of new websites to evaluate the success or failure of the system. Psychologists, designers and computer engineers all agree that a system must be usable; however, the evaluation methods currently in place neglect the measurement of the human aspect and behavior during the evaluation.

This research aims at creating a novel methodology to evaluate the human and qualitative aspects of a usability

test, and fuse that with the typical quantitative aspects.

Jackob Nielsen's research uncovers several areas of web design that are easily translated into qualitative variables including screen real estate, white space, branding etc. [2] While Csikszentmihalyi's theory of 'Flow,' [3] provides a foundation which to classify each variable of interaction and determine which of three categories it falls: 1) Assisting, 2) Neutral, or 3) Challenge. [2]

Activity theory first introduced into the realm of Human Computer Interaction (HCI) by Kaptelinin & Nardi, [4] provide an interesting conceptual framework with which to work in.

## ACTIVITY THEORY

Activity Theory is based in part on the work of Vygotsky, Leont'ev, and has been expanded upon by Yro Engström. In essence, activity theory states that human beings interact with their environment via situations mediated by tools. Through mediation these situations create experiences. "This notion is usually portrayed by what has come to be known as the mediation model of human interactions with the environment." (Mwanza, 2001, p. 344).

Leont'ev developed Vygotsky's initial theory further by providing links between social and cultural mediations, resulting in a hierarchical model of human activity.

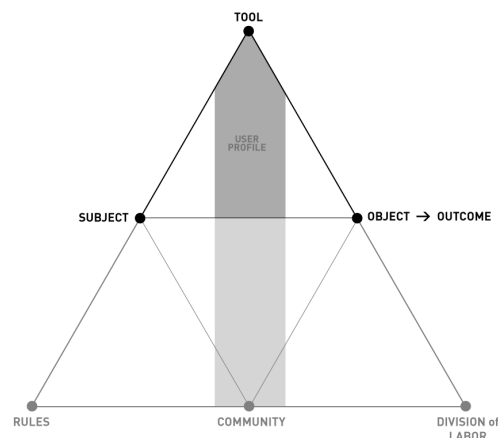


Figure 1. Activity Triangle Model.

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Engström drew upon both Vygotsky and Leont'ev's models of human interaction activity by expanding them to encompass rules, community, and the division of labor. This resulting model has come to be known as the Activity Triangle Model (Figure 1) [5]. Bonnie Nardi and Victor Kaptelinin have applied activity theory to the field of human and computer interaction.

This theory provides an excellent framework through which to explore the interaction between the user, tools, and outcomes with regard to website experience design.

### Components of Activity Theory

Activity theory divides an activity of interest into seven components:

1. The Activity.
2. The Tool.
3. The Subject.
4. The Object.
5. The Rules.
6. The Community.
7. The Division of labor.

Subject describes the user who is enacting the activity, and the object is the motivation or intended outcome of the enactment. The tool, is situated between the subject (user) and the Object (outcome). It is the device, in this case, a ecommerce website, through which the activity is implemented.

The tool facilitates the efforts of the user to achieve the desired outcome. The rules component mediates the activity; as does any culture, pattern, gender, society, or any other factor that imposes any rules on this interaction.

Community refers to the environment in which the activity is completed, and finally, the rules of labor divide existing roles of in the activity (if necessary). It has the effect of assigning duties to those responsible for completion of each task as well as the division of a larger activity into tasks (if necessary).

### THEORY OF FLOW

According to Mihaly Csikszentmihalyi, experience can be described as a journey over the course of a given amount of time [3]. Moreover, "To live means to experience— through doing, feeling, and thinking. Experience takes place in time, so time is the ultimate scarce resource we have" [3]. For this reason, time becomes an essential factor in the interactive system, as well as the concept of optimized emotions, which Csikszentmihalyi calls 'Flow.'

Flow has been described as the point when the optimal levels of challenges (obstacles) and skills (personal) are met. "Flow tends to occur when a person's skills are fully involved in overcoming a challenge that is just about

manageable. Optimal experiences usually involve a fine balance between one's ability to act, and the available opportunities to action" [3]. As skill level rises, challenges must also rise otherwise the user will become bored or apathetic. The optimum level of Flow occurs when the skills are high enough to balance the challenges presented.

When evaluating the usability of a website or system, the relationship between user ability and system challenge must be evaluated to establish the level of Flow for different user groups. One can determine quickly if the design hinders or helps the user during interaction.

### METHODOLOGY: MACRO & MICRO ELEMENTS EMOTIONAL QUALITATIVE MEASURES

Activity and human behavior theory provide solid analytical frameworks through which we will explore, identify, develop, and finally deploy an instrument to assess and predict the emotional response and impact of a given webpage. The investigation of 'emotional impact,' as it relates to web page design must begin with an analysis of user experience.

This analysis will define the affective elements of the interactive experience. The investigation, therefore, begins with a content analysis of current websites, as well as the analysis of widely accepted web design guidelines. It continues with the selection of final evaluation components, moves to solidifying the target audience of interest, and finally ends with the creation of an evaluation matrix.

Content analysis allows us to define and identify both successful and unsuccessful patterns and elements in user interaction within web page design. The analysis will focus on the design and implementation of ecommerce homepages. Through this process, it will be discerned which design elements produce desirable interactions.

These design elements will then be reported in the form of an evaluation matrix. The content analysis investigation tool chosen for this purpose is based on research and case studies that set forth precedence in the areas of homepage design and usability guidelines. This precedence has set standard design patterns for various types of site designs, in particularly homepage design.

The homepage components of interest for content analysis were categorized and highlighted according to the following list adapted from Jakob Nielsen's book, *Homepage Usability: 50 Websites Deconstructed*:

1. Branding.
2. Navigation.
3. Advertising.
4. Content.
5. Other.
6. White Space.

After identification of the common content space, a selection of elements was compiled that would later be used to analyze the composition of the homepages. These elements were again chosen from a group defined by Nielson and Schneiderman based on their ability to provide an assessment of the homepage composition and are color, contrast, hierarchy, legibility, scanability, and elemental purpose [6] [7].

The resulting six elements (macro elements) were analyzed over a broad range of e-commerce sites selected at random from the top 100 e-commerce websites published by Google (see Figure 2). Quantitative statistics measuring each macro mean were generated and provided the statistic with which to apply to the case studies.

**METHODOLOGY: A.E.E.R. RUBRIC**

Activity Theory was used in tandem with content analysis to identify the degree to which Csikszentmihalyi’s concept of ‘Flow’ was present within the composition of each homepage. As described earlier, Flow occurs when the participants’ level of obstacles is in correct proportion with their corresponding level of skill for the particular interaction. Obstacles are defined during a website experience as objects or elements that impede the successful interaction to complete a user defined goal. We therefore utilize the theory of ‘Flow’ to explore the intersection of difficulty and skill level.

In order to achieve a successful rich user experience, we must maximize the motivation level (users desire to interact), while decreasing the amount of obstacles (elements which impede interaction) in hopes of maintaining a positive user experience with any system. Activity Theory provides a framework with which we can base analysis of motivation on and in turn, the necessity of motivation of the user as modulated or created by the tool

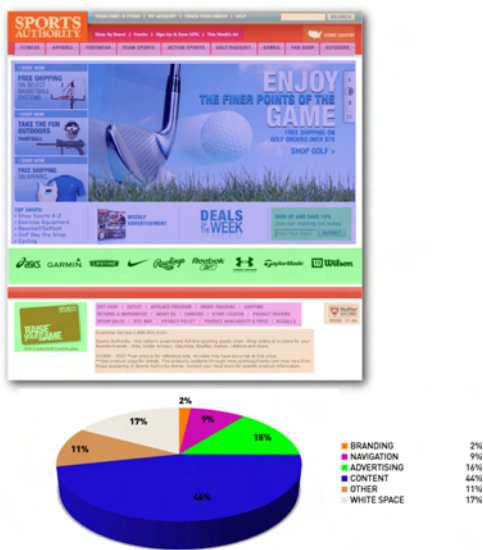


Figure 2. AEER Quadrant II for Amazon.com



Figure 3. AEER Quadrant II for Amazon.com.

(the website), using the skill the user currently possess. The designer must be aware of design precedence whereby not contributing to obstacles during an experience.

By combining these two theories relative user satisfaction can be measured. By quantifying the motivational elements and obstacles present in the homepage a designer can iteratively calculate the relative level of affective impact of the experience. Having captured both quantitative and qualitative data, an instrument was created. This instrument is divided into four quadrants, one measures the quantitative (see Figure 3), one the qualitative data, and the remaining two quadrants contain visual interpretations of these respective values. This resulting instrument is the: Affective Experience Evaluation Rubric (A.E.E.R.) (see Figure 4).

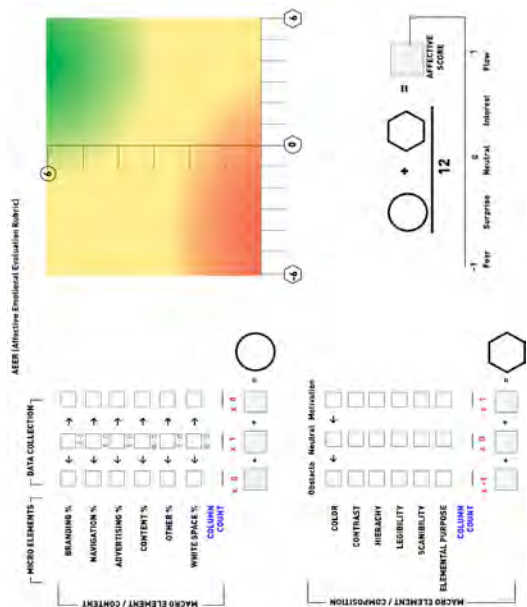


Figure 4. AEER Evaluation Matrix (Rotated 90°).

## CASE STUDY

An initial case study was conducted in order to test the application of AEER to a live website. Bestbuy.com (United States electronic retailer with brick and mortar, as well as e-commerce stores), and Amazon.com were selected from a random list published by Google of the top ten e-commerce websites.

The resulting completed rubrics revealed each site posed obstacles in relationship to user skill level and required additional design attention to assist and generate a positive experience when interacting with the respective sites.

## CONCLUSION

This paper assembles three key concepts and theories and combines them in a unique way to create a rubric which can be used to evaluate the affective impact of an e-commerce website. While one case study has been completed and compiled successfully, a large-scale usability test has commenced to provide internal validity to the resulting evaluation rubric.

Statistical data evaluation methodologies have been intentionally excluded from this extended abstract to allow for expanded discussion between theories and their impact on the resulting methodology.

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