

# Search Behavior on the Internet: a Measurement Model Development<sup>1,2,3,4</sup>

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**Abstract:** Search behavior has been an interesting issue investigated by researchers from many fields. For marketers, it plays a major role to the extent that search behavior must receive the appropriate response from the firms so that the offer matches the needs and desires of potential customers. Although this theme has been researched, little attention has been paid to search behavior an Internet environment. Even though some effort has been put on identifying such patterns, no study has systematically focussed on uncovering the underlying structure of constructs that defines Internet search behavior. Based on the measure development paradigm proposed by Churchill (1979) we developed a measure and conducted a research that contributes to achieve this goal. The findings show evidences that the developed measure is stable and has strong validity.

## 1. Introduction:

The growing interest of marketing researchers on the Internet has suffered from a lack of information about basic issues. This has prevented these researchers from progressing further, based on solid and well established foundation. At this time it is uncertain whether the present literature is able to explain all the phenomena in this new environment. Although we believe in a evolutionary impact on the marketing theory (rather than revolutionary), much work still has to be done in this field. Several unanswered questions about this new context quickly arise. Is the consumer behavior in this environment exactly the same as in a in-store context? Is the cognitive processing of information the same? Are the managers prepared to face the growth rates in supersonic velocities in this environment? Are the organizations prepared to compete with new business concepts (for example, a young company such as AOL acquiring a giant like Time Warner)? Are the marketing models appropriate to explain and predict the future markets? Those are some examples of questions that remain unanswered in the three main areas of marketing, Consumer Behavior, Managerial/Strategy and Marketing Models/Marketing science.

To answer these complex questions, some basic developments still have to be done. In this sense our work proposes to investigate some behavioral patterns on the Internet that can be extremely useful to support further research on the Internet. We focus on the issue of consumer search behavior

Consumer search behavior on the Internet may be classified in a host of ways. However researchers (e.g. Schlosser & Kanfer 1999, Hoffman & Novak 1995) have often used the simple 'browser versus searcher' distinction to classify consumer search behavior. This scale attempts to discriminate Internet users on this browser-searcher continuum.

As defined by Schlosser & Kanfer (1999), a searcher is primarily characterized by task orientation, desire for efficiency, a deliberate mentality and linear oriented search. A browser on the other hand, has the desire to be entertained, have fun and become immersed, and indulge in non-linear search. On a similar note, Hoffman & Novak (1995) indicate that a browser is more likely to experience 'flow' related feelings than a searcher. A more detailed explanation of the other points of difference between these two search behaviors is provided in the subsequent sections.

Although the definitions concerning these two types of behavior seem quite reasonable, to the best of our knowledge there was no attempt to identify the underlying structure of the concepts, that characterize these behaviors. This research differentiates itself from prior works to the extent that we try to uncover this underlying structure through the development of a measurement model.

In the next sections we present the theoretical background that support the development of the measurement model, describe the method employed in the research, present the underlying structure, validate the results, and discuss the managerial and academic implications of this work.

## **2. Literature review and measurement development**

The tendency to browse or search is acknowledged as both, a personal level variable, and a situational variable. However, most research in the past has concentrated on operationalizing search behavior through situational involvement (e.g. Hoffman, Novak & Chatterjee 1995, Schlosser & Kanfer 1999). For example, in their experiment Schlosser & Kanfer (1999) either ask the respondents to "...search for specific product information without wasting any time" (searcher), or ask the respondents to "....find out about the product and enjoy the web site" (browsers). Contrary to efforts like these, this study tries to look at search behavior at an individual level, which can be explained by several personal characteristics. Thus the main aim of this study is to create a scale which discriminates individuals on these two types of search behavior.

The primary contribution of this scale would be in terms of web site design and marketing strategy on the Internet. The ideal web site for a browser would be very different from that preferred by a searcher. If the scale is successful in classifying search behaviors on the Internet then it could be useful in providing broad guidelines on web site design and Internet marketing strategy.

A measure of this search behavior should ideally include as many related aspects as possible. For example, some of these aspects could be the *psychological experiences* while being on the Internet, the *consequences* of a particular type of search behavior, etc. Having items on all these counts will allow the scale to have the maximum discriminating power. In the rest of this section we will first present the aspects of search behavior that tend to discriminate between browsers and searchers. We will also discuss how these aspects discriminate between browsers and searchers.

In addition whenever relevant, items for the scale will also be mentioned. These items are the final ones that were used in the questionnaire. The initial pool of items went through two rounds of refining, clarification, and checks for redundancy, after which the final set was selected. Please note that these items were the final set of items that were tested in the survey (*pre-analysis*) that we conducted and it is *not* the final set of items that we came up with after statistical analysis of the data. The reduction in the number of items from the initial pool was done primarily to reduce redundancy (a more detailed procedure will be provided in the method section). In the following paragraphs we point out the basic concepts related to the searching behavior pattern.

***Preference for Challenges*** – Browsers tend to like environments that provide them with moderate levels of 'challenge' otherwise they are prone to get bored/ uninterested. In

terms of Internet it is possible that ‘challenge’ is reflected through the technical quality of web sites. A clarification of some key terms is in order. First, ‘challenge’ here does not imply a situation where the browser is completely overwhelmed by the technical complexity (or challenge) of the web site. Second, it refers more to a situation where there is a perfect match between the browser’s technical skills and the challenges that the environment offers. Browsers may particularly like web sites that are technically savvy since those may complement their skills. The searchers may not have any particular preference for these types of web sites since their primary motivation is to find information that they are looking for. Whether this information comes from a web site that is sophisticated or seems technically savvy, is not of primary concern. The item selected to represent this dimension is as follows:  
*ITEM:* I especially like web sites which have technically sophisticated features.

***Experience of Focussed Attention*** – Browsers are more likely to experience ‘focussed attention’ than are searchers. Focussed attention is characterized by the centering of attention on a limited stimulus field (Csikzenthimihaly, 1975). In studies of human-computer interactions some computer users particularly, experienced focussed attention. This is primarily because the computer screen functioned as a limited stimulus field which in turn “mesmerized” (Webster, Trevino & Ryan 1993) them. Three items were thought to be representative of this dimension:

*ITEM:* My attention tends to be highly focussed when I am on the Internet.

*ITEM:* While using the Internet, I am oblivious to everything else.

*ITEM:* I get all wrapped up with what I am looking at on the Internet.

***Content Related Preferences*** – Performance characteristics of a web site like ease-of-use and speed are equally preferred by browsers and searchers. However other performance characteristics, like those related to the web site content are capable of discriminating between the two types of search behaviors. Specifically this refers to (a) *interactive* features (like virtual product experiences, links and role-playing) and (b) representational *richness* of the media (e.g. the resolution, graphics and multimedia). It has been shown (Schlosser & Kanfer 1999, Blattberg & Deighton 1991) that searchers tend to prefer presentation formats that are passive (like those offered by traditional marketing media). This implies that searchers are less likely to value *interactive features* in comparison to browsers. Also, *resolution and quality of presentation* will only be important to searchers if it helps them in achieving their task. Resolution and quality by themselves will not be of significant importance to searchers. On the other hand both these aspects are important to the browser since it betters his experience and enjoyment. Keeping this in mind, the following items were selected to represent both the interactive features and the presentation related aspects:

*ITEM:* I like sites which have a lot of links to other sites.

*ITEM:* I like web sites which have a lot of links to other web pages within the same site.

*ITEM:* On the Internet, I dislike encountering ‘cookies’ (i.e. windows containing advertisements which pop-up suddenly).

*ITEM:* Web sites which have lot of banner advertising do not appeal to me.

*ITEM:* I find banner advertising on the Internet very annoying.

*ITEM:* I especially prefer sites with multimedia, like graphics, sound and animation.

***Personality Variables*** – In the literature related to experience of ‘flow’ several situational antecedents of flow are discussed. However in their study Ellis, Voelkl & Morris (1994) found that a lot of the variation could be explained by individual level differences. Even earlier, attempting to look at personality variables Csikzenthimihaly (1975) refers to the ‘autotelic’ personality. In this book he defines the autotelic personality as the person “..who is

able to enjoy what he is doing regardless of whether he will get external rewards from it". However he does not look at measuring it in any way and suggests that this trait may be learned in the family, developed through practice, or even have a neurological origin. In other works like that of Zuckerman (1979) it was established that an autotelic personality is highly correlated to a personality with higher levels of OSL (optimal stimulation level). By the same logic this type of personality trait should also be correlated to arousal seeking tendency (AST), and form versus sensation seeking tendencies in consumers. Keeping these aspects in mind the following items were adapted from the AST scale (Mehrabian & Russell, 1974):

*ITEM:* With the Internet I am constantly seeking new experiences.

*ITEM:* I like surprises when I am using the Internet.

*ITEM:* Web sites should be designed such that they are exciting.

*ITEM:* When I get on to the Internet I often go to unrelated web sites.

*ITEM:* When I am on the Internet, I always end up at a web site that I did not intend to visit.

*ITEM:* I like web sites which often change their web page design.

***Process Related Experiences*** – Goal directed (searcher) and experiential (browser) search behavior can be distinguished (Hoffman & Novak 1995) by (a) motivations (extrinsic vs. intrinsic) (b) orientations (instrumental vs. ritualized) (c) involvement (situational versus enduring) (d) benefits (utilitarian versus hedonic), and (e) choice (goal directed versus navigational). For example, a searcher usually relies on an extrinsic motivation (like the need to replenish groceries) to drive his search on the net. On the other hand, browsers may use the net for product related information even when they do not need to buy a product. Likewise, a ritualized orientation refers to a less intentional, non-selective orientation; a time-filling activity. A broad distinction which conveniently covers all these five aspects is the traditional hedonic versus utilitarian distinction. All the items presented below are designed to capture each of these points of distinction that have been mentioned above. However an attempt was made to make sure that there are not too many overlapping or redundant items.

*ITEM:* I often use the Internet to pass time.

*ITEM:* I am interested in the experience of using the Internet for its own sake.

*ITEM:* I often get on to the Internet with no concrete objective.

*ITEM:* I particularly like sites which are entertaining.

*ITEM:* I always have fun when I am using the Internet.

*ITEM:* On the Internet, I like getting my work done as quickly as possible.

*ITEM:* I like wandering around on the Internet.

*ITEM:* On the Internet, I try to be as efficient as possible.

*ITEM:* On the Internet, I spend minimal time and energy to get my work done.

***Consequences*** – As a result of their intrinsic differences browsers and searchers may differ in terms of their propensity to experience (a) exploratory behavior (b) participatory behavior (c) learning behavior and (d) positive subjective experiences. Exploratory behavior refers to the tendency to experiment; participatory behavior is characterized by a loss of sense of time; learning behavior refers to learning not connected to current activity (or purchase). The four items shown below are aimed at capturing the exploratory, participatory and learning behaviors of the Internet users. The aspect related to positive subjective experiences has already been covered in the previous section concerning process-related experiences. The items areas follows:

*ITEM:* I often visit web sites to find out information just out of curiosity.

*ITEM:* I usually decide before getting on to the Internet, which sites I would like to visit.

*ITEM:* When I am on the net, I like coming across information which is unconnected to my current purpose.

*ITEM:* On the Internet, I don't care if I end up spending a lot of time.

These 29 items comprised the scale that was tested in the questionnaire. The remaining questions that were included in the questionnaire are described in the next section.

**Behavior & Validation Related Questions:** In this section the questions were primarily intended to assess the validity of the scale. In addition, some other questions related to demographics (these questions are not explored in this paper) and general behavior were also asked. The various types of questions asked were as follows:

**Internet Usage** - We wanted to check several things in this section. First, we wanted to know the *amount of time* the respondents spent on the Internet. The first two questions tried to collect that information. We expected the browsers to spend more time on the Internet. The third and fourth questions were put in to ensure that the amount of Internet usage is not confounded by the *quality of facility* used. For example, dial-up connections used from residence facilities are usually much slower than university connections. It is unlikely that a user will browse (in the sense that we are using it) when the facilities are of poor quality. Thus these questions were asked in order to rule out alternative explanations to browsing and searching behavior. The fifth question is about *length of usage* (of Internet). We expected that the length of usage, i.e. *innovator* related qualities, does not necessarily correlate with browsing or searching behavior. This would help in demonstrating the discriminant validity of our measure. The questions asked were:

Q: On average, how many hours per week are you on the Internet? \_\_\_\_\_

Q: Now, without including time spent in (a) internet chat rooms, (b) sending e-mails, and (c) playing games, for how many hours per week do you use the internet? \_\_\_\_\_

Q: Please indicate (check) where do you use the Internet most often?

(a) \_\_\_\_\_ At Home/Residence (b) \_\_\_\_\_ At University

Q: If you use the internet from home then please let us know the kind of facility you use to hook up to the internet (check where appropriate):

(a) \_\_\_\_\_ Dial-up (Telnet) (b) \_\_\_\_\_ Other

Q: Since how long have you been using the Internet on a regular basis? Please indicate the number of years and months below.

\_\_\_\_\_ Years \_\_\_\_\_ Months

**Computer Usage** - In this section the questions were related to computer usage and we expected the scale not to be very highly correlated with these measures. The questions asked were as follows:

Q: How many hours per day do you use a personal computer? \_\_\_\_\_

Q: Since when have you been using a personal computer regularly? Please provide your answer in terms of the number of years and months: \_\_\_\_\_ Years \_\_\_\_\_ Months

**Adeptness at Handling a PC** - We also wanted to know if adeptness at handling personal computers could be driving Internet search behavior. This question was worded as follows:

Q: Compared to the average student in your class, how adept are you at handling personal computers (PC), and related software? Please indicate your response below:

Much better |----|-----|-----|-----|-----|-----| Much worse

**Novelty Seeking** - These questions form the novelty seeking scale (Craig & Grinter, 1975). We expected moderate correlations between the scale and this scale. Moderate correlations would demonstrate the discriminant validity of our scale. This is because novelty

seeking is only partly related to the dimensions that our scale tries to encompass. The four questions were as follows:

Q1. I like to experiment with new ways of doing things.

Q2. I like to fool around with new ideas even if they turn out to be a waste of time.

Q3. I like to try new and different things.

Q4. When I see a new brand on the shelf, I often buy it just to see what it's like.

**Innovator** – An adapted version of the scale created by Goldsmith & Hofacker (1991), was included as a check for discriminant validity. Again in this case, at most moderate correlations with the scale were expected. An innovator may not necessarily a browser. The questions used were:

Q1. In general, I am among the first in my circle of friends to visit and find out about new, exciting web sites when they appear.

Q2. Compared to my friends I visit a lot more web sites.

Q3. I usually prefer visiting web sites which are well tried and tested i.e., sites which my friends have already tried out and told me about their experiences.

**List of Values (life values)** – Since browsing and searching is an Internet related search behavior, we expected its influence to be very medium specific. In other words, the browser-searcher orientation of an individual is not a global behavior-guiding principle. Thus we expected it to have a low correlation with general life values like hedonism. We used the list of values scale (Kahle, 1983) for this purpose. Specifically we wanted to look at the scores on two items (items 2 and 6 shown below) from this scale that correspond to the 'hedonic' dimension. The entire question is shown below:

Q: The following is a list of things people look for or want in life. Please study the list carefully and then rate each thing on how important it is in your daily life, where 1 = very important, and 9 = very unimportant.

1. Sense of belonging; 2. *Excitement*; 3. Warm relationships with others; 4. Self-fulfillment; 5. Being well respected; 6. *Fun and enjoyment of life*; 7. Security; 8. Self-respect; 9. A sense of accomplishment

**Self-classification** – Finally we included a question that asked the respondents to classify their own (i.e. self-classify) search behavior on the Internet. This question was asked at the very end to avoid sensitizing the respondent (however this question is not assessed in this paper). The question was framed as follows:

Q: In a recent issue of PC Week, a study claimed that there are two types of Internet users. The description of these two groups of users is reproduced below. After reading the description please answer the question that follows:

“A searcher is primarily characterized by task orientation, desire for efficiency, a deliberate mentality and linear search. A browser on the other hand, has the desire to be entertained, have fun and become immersed, and indulge in non linear search.”

Which of the following descriptions fit your Internet usage behavior the best? Please indicate (check) one:

Almost always a 'browser' \_\_\_\_\_

Mostly a 'browser' although I am a 'searcher' sometimes \_\_\_\_\_

Mostly a 'searcher' although I am a 'browser' sometimes \_\_\_\_\_

Almost always a 'searcher' \_\_\_\_\_

### 3. Method

The measures employed in this paper were both derived from existing literature and self-generated. Some measures were directly extracted from the literature and used as such. Other items were either adapted from existing measures or were generated by the researchers based on the relevant literature.

The pool of items comprising search behavior went through several rounds of editing. At this stage, besides clarifications with respect to construct definitions, judges eliminated overlapping items and rephrased items that had misleading or ambiguous wordings. For validation purposes, we also collected subject's responses on a few related, but conceptually different constructs (e.g. the 'flow' experience), some socio-demographic variables, as well as patterns of Internet usage. The items were balanced between Search/browser characteristics to avoid the acquiescence bias (agreement bias).

Undergraduate students (frequent Internet users) from the subject pool of a big southeastern university (United States) participated in the experiment sessions in exchange for course credit. Subjects filled in the questionnaires in single sessions, each session comprising of 15 students on average. The students showed experience with Internet usage and all responses were considered usable. A total of 138 (144 originally but 6 Ss failed to accomplish the task) observations composed the sample used to test our model.

It deserves mention that the final pool of items was exposed to a second round of refinement. Judges were used to exclude (a) items which the subjects did not respond to at all, and (b) items which had a very low rate of response. The items were measured employing a seven points semantic differential agreement scale.

To purify our measure of Internet search behavior we used principal components factor analysis (a priori, two factors were generated in keeping with the searcher/browser distinction which we accepted from the existing literature). All the variables (a) that loaded below 0.50 on a factor (b) with communality below 0.50, or (c) loading high on both factors (greater or equal to 0.40 in both factors) were excluded from further analysis. We ran a factor analysis excluding the variables that did not reach these proposed thresholds. The main aim was to retain only those items that fit these pre-specified criteria.

Besides search behavior, we also purified other scale measures that we used. The Cronbach Alpha was used to retain items such that the measures were reliable. Some items were deleted since their removal improved the scale properties of the measure, i.e., the reliability of the measure increased when these items were removed.

#### **Data Collection:**

The student subject pool of the MAR 3023 (Principles of Marketing), and QMB 3250 (Quantitative Methods in Business) was used for collecting data. The sample size was 138 subjects. The number of items-to-sample size ratio is not adequate for a 29-item scale. However, the sample size is large enough to permit a good quality preliminary data analysis. The details of the analysis are provided in the next section.

### 4. Analysis and findings:

The analysis can be best described in the following steps:

**Step 1: Factor Analysis** – A factor analysis was conducted with all 29 items using varimax rotation. The assumption of orthogonality among the factors was done for the sake of easy interpretation. We decided to use the following criterion for dropping items:

1. We decided to reject all items that had loadings less than 0.50.
2. We also decided to reject items that had high loadings (above 0.40) on more than one factor.
3. Finally, we also excluded items that had communalities below 0.50.

Based on these three rules, new structures were specified and the factor analysis was rerun until all the items met these thresholds. This process took a total of 6 rounds at the end of which we were left with a 6-factor, 15-item model. The details of the first and last rounds are enclosed in the appendix. We then submitted this version of the scale for reliability analysis. Table 1 presents this factor structure:

<b>Factors:</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>Alpha</b>
<b><u>Factor 1:</u></b>							
17) I particularly like sites which are entertaining.	0.87						0.81
9) Web sites should be designed such that they are exciting.	0.85						
3) I especially prefer sites with multimedia, like graphics, sound and animation.	0.80						
<b><u>Factor 2:</u></b>							
18) When I get on to the Internet I often go to unrelated web sites.		0.78					0.66
19) When I am on the Internet, I always end up at a web site that I did not intend to visit.		0.77					
10) When I am on the net, I like coming across information which is unconnected to my current purpose.		0.68					
<b><u>Factor 3:</u></b>							
13) I like sites which have a lot of links to other sites.			0.90				0.80
7) I like web sites which have a lot of links to other web pages within the same site.			0.87				
<b><u>Factor 4:</u></b>							
23) I am interested in the experience of using the Internet for its own sake.				0.81			0.62
22) With the Internet I am constantly seeking new experiences.				0.78			
27) I often visit web sites to find out information just out of curiosity.				0.55			
<b><u>Factor 5:</u></b>							
1) Web sites which have lot of banner advertising do not appeal to me.					0.89		0.75
15) I find banner advertising on the Internet very annoying.					0.88		
<b><u>Factor 6:</u></b>							
20) I usually decide before getting on to the Internet, which sites I would like to visit.						0.76	0.37
2) I like surprises when I am using the Internet.						0.74	

Table 1 – first stable factor structure

**Step 2: Reliability** – We used the Cronbach Alpha to test for reliability of each dimension that emerged from the factor analysis. The sixth factor was dropped off because of an unacceptable alpha value of 0.37. Although factor 2 and factor 4 had relatively low reliability values of 0.66 & 0.62 respectively, we retained both since these values are acceptable for a first attempt at scale development. The five factors that we retained may be labeled as ‘Entertainment’, ‘Wandering’, ‘Diversity’, ‘Novelty’ and ‘Advertising Aversion’ (the labels were derived based on the set of variables comprising each factor ). The



reliabilities of these five factors were 0.81, 0.66, 0.80, 0.62, and 0.75 respectively. Thus these five factors and the thirteen corresponding items comprised the final version of the scale. The results are presented in Table 2

<b>Factors (variable name used in further analysis):</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>Alpha</b>
<b><u>Entertainment (entert)</u></b>							
17) I particularly like sites which are entertaining.	0.87						0.81
9) Web sites should be designed such that they are exciting.	0.85						
3) I especially prefer sites with multimedia, like graphics, sound and animation.	0.80						
<b><u>Wandering (wander)</u></b>							
18) When I get on to the Internet I often go to unrelated web sites.		0.78					0.66
19) When I am on the Internet, I always end up at a web site that I did not intend to visit.		0.77					
10) When I am on the net, I like coming across information which is unconnected to my current purpose.		0.68					
<b><u>Diversity (divers)</u></b>							
13) I like sites which have a lot of links to other sites.			0.90				0.80
7) I like web sites which have a lot of links to other web pages within the same site.			0.87				
<b><u>Novelty (novel)</u></b>							
23) I am interested in the experience of using the Internet for its own sake.				0.81			0.62
22) With the Internet I am constantly seeking new experiences.				0.78			
27) I often visit web sites to find out information just out of curiosity.				0.55			
<b><u>Advertising Aversion (adavers)</u></b>							
1) Web sites which have lot of banner advertising do not appeal to me.					0.89		0.75
15) I find banner advertising on the Internet very annoying.					0.88		

Table 2 – Final factor solution and pool of items

### Validity Check:

***Discriminant Validity*** – Three scales measuring related constructs were used to check the discriminant validity of the final version of the scale. These three scales, as they were used in the questionnaire, are reproduced below:

#### ***1) Novelty Seeking (novseek)***

- 40) I like to experiment with new ways of doing things.
- 41) I like to fool around with new ideas even if they turn out to be a waste of time.
- 42) I like to try new and different things.
- 43) When I see a new brand on the shelf, I often buy it just to see what it's like.

I Completely Disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ I Completely Agree

#### ***2) Innovator (innovator)***

- 44) In general, I am among the first in my circle of friends to visit and find out about new, exciting web sites when they appear.

45) Compared to my friends I visit a lot more web sites.

46) I usually prefer visiting web sites which are well tried and tested i.e., sites which my friends have already tried out and told me about their experiences.

I Completely Disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ I Completely Agree

### 3) Hedonic

The following is a list of things people look for or want in life. Please study the list carefully and then rate each thing on how important it is in your daily life, where 1 = very important, and 9 = very unimportant.

48) Excitement

52) Fun and enjoyment of life

Very important 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ Very unimportant

A reliability check of the novelty seeking scale indicated that the last item (#43) severely damaged the reliability of the scale and it was dropped off. A similar analysis also indicated that the last item (#46) of the innovator scale also had a very low reliability. This item was also dropped off. Since the response scales differed across these three scales (7-point & 9-point scales), we averaged and standardized (z-scores) each of these scales creating three new variates. The five factors that comprised the final version of the scale were also averaged and standardized. To check the discriminant validity we ran a correlation analysis among all these new variates that were created. The results of the correlation analysis was the same when the factor regression scores were used directly from the factor analysis instead of the variates that we created. Using the variates, the following results were obtained:

	Entert	Wander	Divers	Novel	Adavers	Novseek	Innovator	Hedonic
Entert	1.00							
Wander	0.00	1.00						
Divers	0.19*	0.10	1.00					
Novel	0.18*	0.27**	0.21*	1.00				
Adavers	0.01	0.03	0.12	0.09	1.00			
Novseek	0.02	0.08	0.23**	0.25**	-0.05	1.00		
Innov	0.00	0.30**	0.20*	0.45**	0.05	0.31**	1.00	
Hedonic	0.07	-0.01	0.02	0.19*	0.00	0.12	0.08	1.00

Table 3 – First discriminant validity check

\* Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed).

These results provide considerable evidence that our scale has discriminant validity. There are two things to look for:

1. The number of significant correlations, and
2. The magnitude of the correlations which are significant.

Although there are several correlations that are significant none of them are very high. Novelty seeking is significantly correlated with the dimensions ‘Diversity’ and ‘Novelty’ (i.e. factors 3 and 4). However the magnitude of the correlations (0.23 & 0.25) is low. The scale to measure hedonism is significantly correlated to only the ‘Novelty’ dimension (factor 4). However this correlation was quite low (0.19). Finally, the innovator scale had three significant correlations. These correlations were with factor 2 (‘Wandering’), factor 3 (‘Diversity’) and factor 4 (‘Novelty’). The correlations were 0.30, 0.20 and 0.45 respectively.

The results were only slightly different when we created another variate by averaging all the five factors. The correlation analysis then produced the following results:

	Novseek.	Innov.	Hedonic	Total score
Novseek	1.00			
Innov	0.31**	1.00		
Hedonic	0.12	0.08	1.00	
Total score	0.19*	0.37**	0.10	1.00

Table 4 – Correlations among the related constructs employed

\* Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed).

In summary, these results demonstrate the discriminant validity of the scale. *First*, of the 15 correlations of interest only 6 are statistically significant. *Second*, the magnitudes of the significant correlations are quite low. Discriminant validity of a scale is often threatened by “...too high a correlation with other tests from which they were intended to differ..” (Churchill, 1979). Quite clearly in our case (a) very few correlations are significant and (b) even among the correlations that are significant, none of the correlations are *too high*. In fact the maximum correlation is 0.45, while most are around 0.20.

While this suffices for establishing discriminant validity, we tried to refine our scale further. This stage was prompted by the fact that it may be very difficult to establish which of the correlations are ‘too high’ and therefore threaten the discriminant validity. Conventional standards label correlations that are 0.5 or greater, as evidence of high correlation. However there is considerable confusion about this ‘convention’ and we decided to carry out another step of refining. For all practical purposes we would recommend that the five factor, thirteen-item version of the scale be used. However, if the reader judges these correlations to be ‘too high’ then the next step in our analysis is appropriate.

**Further Refinements** – In this step of the analysis we excluded the items comprising factor 4 (‘Novelty’) because (a) it had the lowest reliability among the five factors, and (b) it was the only factor which had significant correlations with all three scales – novelty seeking, innovator, and hedonism. We also dropped the ‘Innovator’ scale as a check for discriminant validity since it was highly correlated (correlation significant at  $p < 0.01$ ) to the ‘Novelty Seeking’ scale. Therefore we retained the novelty seeking scale and dropped the innovator scale to avoid redundancy. Thus we now conducted a correlation analysis with the remaining four factors and the other two scales (hedonism, novelty seeking). The results were as follows:

	Entert	Wander	Divers	Adavers	Novseek	Hedonic
Entert	1.00					
Wander	0.00	1.00				
Divers	0.19*	0.10	1.00			
Adavers	0.01	0.03	0.12	1.00		
Novseek	0.02	0.08	0.23**	-0.05	1.00	
Hedonic	0.07	-0.01	0.02	0.00	0.12	1.00

Table 5 – updated discriminant validity table (without facto 4).

\*\* Correlation is significant at the 0.01 level (2-tailed).

	Novseek	Hedonic	Total score
Novseek	1.00		
Hedonic	0.12	1.00	
Total score	0.14	0.03	1.00

Table 6 – Correlations with the total score variate excluded factor 4.

**NB:** No Correlation significant at the 0.10 level (2-tailed).

As the results show, using the first measure, only factor 3 ('Diversity') correlated significantly with the other scales. Using the second type of measure (variate with the total score), no significant correlation was found. This gives us very strong evidence of discriminant validity.

**Convergent & Nomological Validity** – To demonstrate convergent validity of our scale we would have to show high correlations with other methods of measuring the same construct/behavior. Since we were not aware of any other method of measuring Internet search behavior, we could not conduct a convergent validity analysis. Likewise we were unable to demonstrate nomological validity due to the lack of related concepts and theories that are regarded as well established. Theories related to searching-browsing are relatively new, poorly developed and mostly to be found in trade journals. In addition we were also constrained by time. Thus the scale remains deficient on these counts. Further work needs to be done to refine the scale.

## 5. Discussion and directions for future research

The most direct managerial implication of this study is related to issues of web site design and Internet presence strategy. The recognition that these 2 types of behavior search exist and the knowledge about the underlying structure may allow managers to develop customized approaches according to those behaviors. This is a relevant issue in terms of segmentation in Internet contexts.

The firms can develop, based on this knowledge, Internet interfaces that match the search behavior patterns of potential customers making the navigational experience much more pleasant. For example for browsers a company can develop a more experiential navigation, offering the option to virtually test the product (such as the camera tests at the Kodak site – [www.kodak.com](http://www.kodak.com)). For a searcher, the company can develop a way to present its offer so that it matches the searchers efficiency oriented pattern of search behavior. Even different sites can be considered for each type of behavior, specially if the company is able to gather the necessary information to classify those individuals (assuming a degree of stability of these behaviors and that they are not strictly situational but dependent on stable factors such as personality). For example, an Internet based store/mall could build separate sites for first time visitors (who are more likely to be 'browsers') and regular visitors (who are more likely to be 'searchers').

From the academic point of view, this research contributes by uncovering and validating the underlying structure of factors that potentially supports the these two types of search behavior. Using a rigorous scientific procedure (as suggested by Churchill, 1979) we ended up with a scale that can be a starting point for the refinement and development of a

deeper knowledge body about these Internet search behavior patterns. This scale also contributed to identify some qualitative characteristics of these buying behaviors.

A natural extension of this work would be the use of confirmatory techniques, such as Confirmatory Factor Analysis in a hold out sample, in order to evaluate the stability and validity of this scale. Afterwards, setting up a causal model that accounts not only for the search behavior, but also for the antecedents (such as personality traits) and the consequences (such as actual buying behavior and satisfaction with the experience) of these search behavior patterns.

#### **End notes:**

1 – The authors are listed in alphabetical order for lexicographic convenience; all authors contributed equally in this paper;

2 – The authors are indebted to the support provided by Yu Bo Chen (Doctoral Student, Marketing Department, University of Florida), Jan Rickyman (exchange student at the University of Florida at the time of this project) and Claude Pecheux (Doctoral Student at FUCAM, Belgium and visiting student at the University of Florida at the time that research was conducted) in earlier stages of this research;

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