



Measurement and Analysis of Information Retrieval Experience from the Perspective of Psychological Flow Theory

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Abstract. [purpose/meaning] By using the theory of flow design scale to measure and analysis, to explore individual emotional experience in information retrieval activities regularly. [method/process] using the experience sampling method, a questionnaire survey was conducted on the users' information retrieval in three university libraries, and the quality of the test scale was analyzed by using the data statistical analysis. On the basis of investigation in skill dimensions, challenge dimension and skill and challenge of balance dimension score, the sample book is divided into flow, anxiety, cold and dull the four channels, and compare the different channel quality of experience. [Results/conclusion] according to the results of the questionnaire, the scale is an effective tool to measure information retrieval experience, skills and challenge level and the degree of match between the two is the key variable affecting information retrieval experience, skills and challenges. Match of the two and were in a high level of circulation way to experience the best , cold channel is worst experience, anxiety and boring channel is in the middle.

Keywords: information retrieval, flow theory, user experience.

1 Introduction

Information retrieval is an integration process integrating physical operation, emotional experience and cognitive thinking [1]. No doubt, the user is always in the process of information retrieval experience different emotional experience, which may be negative emotions such as tension, anxiety, being cold and dull, and may also be the positive emotion, such as being joy, happy, relaxed and enjoy, or positive and negative emotional staggered [2]. It is an important variable affecting information retrieval effect and plays a crucial role in information retrieval [3]. Compared with the cognitive perspective information retrieval, the research on the experience perspective is very few, and the research on the emotional experience in information retrieval is still in the exploratory stage.

As a classical theory of psychology, flow theory opens up new horizons for information retrieval of emotional experience. It is reported that information retrieval in

network activities is the most common activity of flow of psychology [4]. The academic community realized that only by returning to the essence of the flow of psychology can the flow concept of psychology accurately be manipulated.[5] It is suggested to use the multidimensional scale to compare the differences through the multidimensional data and then develop the unity of the flow rate of the psychology. The author uses the flow theory design scale to measure and analyze the information retrieval experience, and explore the emotional experience rule of the individual in the information retrieval activity.

2 Flow theory

2.1 The Origin of the Theory

Flow concept first appeared in M. Csikszentmihalyi study, at the time of his hundreds of artists, athletes, musicians, chess expert and surgeons interview, found that these different respondents when engaged in relevant activities have been through a very similar "optimal experience", some people use metaphors "flow" to describe their instant feelings, claimed that the feeling of effortless and continuously produce. M. Csikszentmihalyi defined this "Best experience" as a flow that is in the state of "flow" of individuals into the activities engaged in by completely. When people are in the body When checking the flow, they feel that perception is effective, convenient, extremely excited and rich.[6]And research shows that the stronger the counter-flow experience, such as anxiety and boredom, the worse the grades[7]and the interface design of tourism App based on heart flow experience can reduce the effort of user operation and make the interface operation more orderly.[8]

Flow is the best psychological experience when individuals challenge and balance their skills in specific situations. In order to show all possibilities of relationships between challenge and skill, flow channel segmentation model arises at the moment.

2.2 Channel Model

The initial flow segmentation model is a three-way model, and its core is the matching degree between the comparison skill and the challenge. When skills greater than challenges, individuals feel bored, and when the challenge is greater than the skill, will feel anxious, only when the skills and challenges is similar. could that enter the "flow". The study found that when challenges and skills were at a low level, individuals did not enter the "flow state", but rather apathy. Hence, three-channel model was revised to anxiety, apathy, flow and dull experience the four channel models, anxiety is that when the individual skills could not reach the requirements of activities challenge, participants brothers no measures or upset, produce frustration; Apathy refers to the activity is unromantic, the individual is depressed and unwilling to participate; The flow of the heart is the sensation of body and mind obtained by the high input activity, which usually produces the incomparable joy and satisfaction of the individual. Boring is the activity is boring, the participant is listless, the mind is disgusted. As show in figure 1.

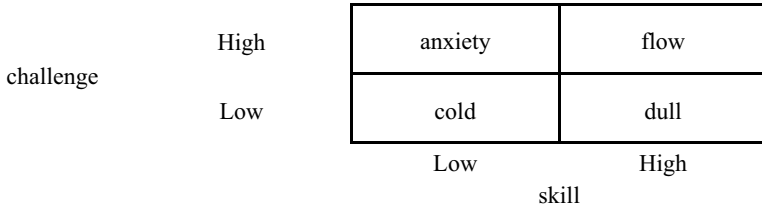


Fig. 1. flow 4-channel model

In the offline life, challenge and skill to match is not much, because of most of the activities we do will not usually need to set up a goal, don't need feedback, don't need our special attention, do not need special involvement, more do not need to learn skills, and these elements in the network environment highlight.[11]

In addition flow experience is clear goals, immediate feedback, matching skills and challenges, integration of actions and perception, focusing on doing things, potential sense of control, loss of self-awareness, change in sense of time, and purposeful experience.[9]

3 Research Design

3.1 Scale Design

Although in the past 20 years, foreign academic research on network flow is very rich, but due to vague definition of the concept of flow, academic circles can not reach the same definition of flow, measuring scales are not standardized and unified. In addition to the heart rate scale developed in the field of sports, the research in this area is very sparse, and we lack a mature measurement scale. Information retrieval models aim to range from large-scale, and often unstructured, numbers According to the source to find the needs of the user information, is often applied to search engines or Questions and answers, and recommendation tasks.[10] In order to guarantee the quality of the scale, the author reviewed the flow under the network environment in the past 20 years the dimension and its definition and measurement of performance, reference abroad study using scale,10,14 , and integrated domestic Chinese translation table , compiled the heart flow information retrieval situation (see table 1). In addition to the goal clarity, immediate feedback, skill and challenge matching, awareness and alignment, concentration, mastery, spontaneity, time illusion, and self-goal.[12]

Table 1. Flow statement of information retrieval situation.

Variable	questions
Skill	S1 I'm good at using the Internet. S2 I have a good command of Internet search. S3 I know less about the Internet than most users. S4 I know how to find the information I need on the Internet.
Challenges	C1 search task is a challenge for me.

	<p>C2 retrieval task requires me to do my utmost to complete the challenge.</p> <p>C3 search task is a good test of my search skills.</p> <p>C4 retrieval task puts my abilities to the limit.</p>
Skill and challenge balance	<p>CS1 I am competent for the challenge of retrieval.</p> <p>CS2 my ability matches the high requirement of retrieval.</p> <p>CS3 I think my ability is enough to satisfy the high requirement of retrieval.</p> <p>CS4 retrieval challenge is equivalent to my ability level.</p>
Clear goals	<p>CG1 I know exactly what I want to do.</p> <p>CG2 I clearly realized what I wanted to do.</p> <p>CG3 my goal is clearly defined.</p> <p>CG4 I know what I want to achieve.</p>
Immediate feedback	<p>IF1 when I am searching, I know my level of performance.</p> <p>IF2 When I retrieve , I know how I'm doing.</p>
Under control	<p>CT2 I feel able to control the retrieval process.</p> <p>CT2 When retrieving, I have a sense of control.</p> <p>CT3 I feel completely able to control my actions and reactions.</p> <p>CT4 I feel completely in control of the retrieval activity.</p> <p>CT5 When retrieving, I have my heart set.</p>
Time illusion	<p>AT1 retrieval time is faster than I thought.</p> <p>AT2 Time passes quickly when is retrieved.</p> <p>AT3 Time flies when is retrieved.</p>
Totally forget myself	<p>LS1 I don't care what other people might think of me when I'm searching .</p> <p>LS2 When I search , I don't care what others might say about myself.</p> <p>LS3 When I search , I don't worry about what others might think of me.</p>
In the environmental sense	<p>When TE1 was retrieved, I feel like I am in the Internet world, not the real world.</p> <p>When TE2 was retrieved, I felt immersed in the online world.</p> <p>When TE3 is retrieved, it feels as if it is returning from another world to the real world.</p>
Self target	<p>AE1 I enjoy the experience.</p> <p>AE2 I like the feeling of this retrieval and want to experience it again.</p> <p>AE3 I think the experience was worth it.</p>
Concentrate on	<p>CN1 My attention is completely focused on the ongoing retrieval activity.</p> <p>When CN2 was retrieved, I was completely absorbed.</p> <p>CN3 I concentrate on the task at hand.</p>
Knowledge and action should go hand in hand.	<p>M1 It is natural for me to do a search operation.</p> <p>M2 my search operation is automatic, no too much thinking .</p> <p>M3 I feel that the operation and response in the retrieval process are smooth.</p>

Note: R is the reverse question, and the combination of variable knowledge and practice is deleted because the load of the question factor is not up to the standard.

3.2 Data Collection

Flow is a transient internal experience, in order to capture the flow experience without disturbing the independent behavior of the subject, experience sampling method appeared. The core idea is to obtain the internal feeling report of the individual randomly during the study, so as to ensure the accuracy and objectivity of the results. In November 2018, the author conducted an investigation in the library of Yantai university, the library of Ludong university studies, and the library of Shandong Institute of Business and technology. Through the manual identification, the subjects were searched through the academic database, and they were given questionnaires and asked to complete them immediately, so as to capture the experience of the real-time experience to the greatest extent. A total of 300 questionnaires were distributed, and 221 were recovered, with 173 valid questionnaires. In the effective sample, men make up 26%, women 72. 8%; Most of them are 20 to 24 years old; In terms of education, the majority of this section (the ratio is 90.2%), followed by the master's degree(8.1%) and finally junior college student(1. 7%). In the database used by the sample, China knowledge network accounts for 93.1%. Wanfang makes up for 9% , and Kingbase, Web of Science, EBSCO, etc.

4 Data Analysis

4.1 Reliability Analysis

Reliability is the stability and consistency of the measurement results before and after the same conditions. Cronbach is usually used in social science research. The alpha coefficient is used as an indicator of the internal consistency of likert scale. As shown in table 2, the Cronbach alpha coefficient of each variable is higher than 0. 7, showing that the reliability of measurement reaches satisfactory level.

Table 2. results of reliability analysis

Variable	Cronbach	Number of questions
Skill	0. 782	4
Challenge	0. 715	4
Skill and challenge balance	0. 796	4
Clear goal	0. 837	4
Instant feedback	0.735	2
concentration.	0.8653	3
Be in control	0. 8165	5
Forget me	0. 9213	3
Time illusion	0. 9043	3
Self goal	0. 8023	3
Border sense	0. 7733	3

4.2 Factor Analysis

The validity of the scale was verified by exploratory factor analysis. The principal component factor analysis method is used to maximize the orthogonal rotation of the variance, and the characteristic value is greater than or equal to 1 as the interception principle of factors, while taking into account the theoretical basis and individual. In the case of a reasonable number of factors and close to 1 as the standard intercept data; Load value 0. 5. As the criterion of dimension index, if the load of the same item on all factors is less than 0.5, or the load on both factors is greater than 0. 5. The entry is deleted.

In the exploratory factor analysis of technique and challenge factors, KMO value is 0.707, Bartlett sphericity test reached a significant level ($P < 0. 000$), suitable for factor analysis, and the specific analysis results are shown in table 3. Two factors are analyzed, and the variance is 60. 608%, the first factor loading is the skill dimension, the second factor is the challenge dimension.

Table 3. exploratory factor analysis results of skill and challenge factors

Name of the factors	Questions	F1	F2
Skills	S1	0. 810	
	S2	0. 851	
	S3	0. 676	
	S4	0. 757	
challenge	C1		
	C2		0.745
	C3		0.721
	C4		0.801
Value	4.428	1.557	0.893
Explain variance percentage (%)		36.390	24.127

In the exploratory factor analysis of the flow leading factor in the heart flow, according to flow theory, the force is divided into three factors, and their KMO value is 0.841, the Bartlett ball test reached a significant level ($P < 0$). The data is suitable for factor analysis, and the specific analysis results are shown in table 4. The eigenvalue of the immediate feedback factor is 0.893. The characteristic values of skill and challenge balance and target clear factor are greater than 1, and the cumulative interpretation variance of the three factors is 68. 780%. Therefore, the flow leading factor is confirmed at the data level.

Table 4. Results of exploratory factor analysis of flow preconditioning factors

Name of the factors	Questions	F1	F2	F3
Skill and challenge balance	CS1	0.668		
	CS2	0.763		
	CS3	0.782		

	CS4	0.824		
Clear goal	CG1		0.750	
	CG2		0.773	
	CG3		0.823	
	CG4		0.747	
Instant feedback	IF1			0.861
	IF2			0.767
Feature value	4.428	1.557	0.893	
Explain the percentage of variance		44.283	15.566	8.931

5 Conclusion

The author on the basis of the theory of flow design scale to measure the experience of information retrieval, in addition to the unity of knowledge and act factor failed to identify, target clear, immediate feedback, skills and challenges balance, under control, time illusion, unaware of myself, feeling of being in the environment, concentration and self accomplished goal is supported by factor analysis, and all factors at a satisfactory level of reliability. The research results show that all factors of flow are basically applicable to information retrieval situations, and the scale developed based on it is an effective tool for measuring information retrieval experience.

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