

# Presence vs. Flow in the Context of Computer Games

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## Abstract

*Flow and presence share several similarities such as the immersive component and intense feelings of involvement. Until today, relatively little attention has been paid to the connection between the two concepts. Thus, the purpose of this study (N = 70) was to examine whether presence and flow are related in the context of computer games. Factor analysis proved presence and flow to be two distinct constructs. In addition, flow seems to mediate the relationship between presence and enjoyment.*

## 1. Introduction and theoretical considerations

The aim of this study was to analyse the connection between presence and flow in the context of an online game. Furthermore, the influence of these two concepts on enjoyment was analysed.

### 1.1. Presence

Presence describes a state of consciousness that gives the impression of being physically present in a mediated world. According to Lombard and Ditton [1] presence is a perceptual illusion of non-mediation.

### 1.2. Flow

Flow is characterized by intense involvement, clarity of goals and feedback, concentrating and focusing, lack of self-consciousness, distorted sense of time, balance between the challenge and the skills required to meet it, and finally the feeling of full control over the activity [2].

An adaption of this concept with regard to the specific experiences of computer users was assessed by Rheinberg, Vollmeyer, and Engeser [3]. In a factor analytical approach, they found that the construct contains two dimensions: (1) smooth and automatic running and (2) absorption. The first factor refers to the feeling of utmost concentration and focusing, the second factor to the feeling of full involvement.

### 1.3. Presence and flow: similarities and differences

According to Draper, Kaber and Usher [4] presence can be defined as a special type of flow experience that occurs during teleoperations. Bystrom, Barfield, and Hendrix [5] assume a feedback loop between task characteristics,

attentional allocation, and presence. They consider this loop to be similar to the flow concept. The similarities of flow and presence are also pointed out by Fontaine [6] who states that the flow experience produces peaks of involvement that seem to be similar to the vividness of presence.

But there are also differences between the two concepts. Presence has often been described as immersion into a virtual environment; in contrast, flow rather refers to an experience of immersion into a certain activity. Thus, the concept of flow focuses more on task characteristics, while the concept of presence is more focused on technological characteristics of a medium.

## 2. Method

### 2.1. Participants and stimulus material

A total of 70 students (37 females and 33 males) participated in the experiment with an average age of 23.9 years (SD = 5.42). For the experiment, all participants played the online game *Neverwinter Nights* for 30 minutes. Thereby, as many parameters as possible such as the procedure of the game were standardised.

### 2.2. Measurement instruments

*Presence* was measured with the presence-scale by Kim and Biocca [7]. The scale represent the two dimensions arrival (the feeling of being present in a mediated environment) and departure (the feeling of no longer being present in the immediate physical environment).

*Flow* was assessed using the flow short scale by Rheinberg et al. [3]. The scale measures the two dimensions smooth and automatic running and absorption.

*Enjoyment* was measured with one single item ("Did you enjoy the game?", 1 = not at all; 5 = very much).

## 3. Results and Discussion

### 3.1 Factor analysis

The relation between presence and flow was first tested by means of principal axis factor analysis. The scree test suggests a two-factor-solution. Table 1 shows this solution which explains 38.7% of the variance. Theoretical considerations (e.g. Draper et al. [4]) allow the assumption that the two concepts presence and flow share variance. Within our experiment, this is not the case, as table 1 shows.

**Table 1**  
*Principal axis factoring\**

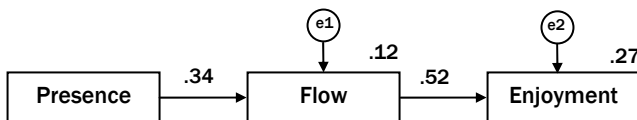
Factor	Item	1	2
Presence	Arrival	1	.819
		2	.733
		3	.751
		4	
		5	.629
Flow	Smooth and automatic running	6	
		7	
		8	
		9	
		10	
Absorption	Absorption	1	
		2	.766
		3	.574
		4	
		5	.644
Flow	Smooth and automatic running	6	.647
		7	.743
		8	.609
		9	.599
		10	.603
% of variance explained		22.0	16.7

\* Rotation method: Varimax with Kaiser Normalization.  
Note: Values less than .5 are suppressed. *MSA* = .78

The varimax rotation extracts a first factor consisting of eight out of ten flow-items. Thus, flow as proposed by Rheinberg et al. [3] is an unidimensional construct consisting of absorption as well as smooth and automatic running. The second factor mainly consists of four out of five items of the presence subdimension arrival, whereas the loadings of items of the subdimension departure were low.

**2.1. Path analysis**

The following analysis is based on the two factor solution that was reported above. For further investigation concerning the question whether, how and to what extent flow and presence influence enjoyment, a path analysis was conducted. The results show that flow mediates the relationship between presence and enjoyment (figure 1). Thereby, the fit indices suggest the model to be acceptable ( $\chi^2 = 2.59$ ;  $df = 1$ ;  $p = .11$ ;  $GFI = .98$ ;  $CFI = .95$ ;  $RMSEA = .07$ ).



**Figure 1: Flow mediates the relationship between presence and enjoyment.**

This mediation was additionally tested by using the steps by Baron and Kenny [8] (table 2). These results clarify that the feeling of presence facilitates the occurrence of flow and flow in turn seems to enhance enjoyment while playing games. When analysing the data in another way around, the results show that presence doesn't mediate the relationship between flow and enjoyment.

**Table 2**  
*Regression analysis for predicting enjoyment*

Predictor	Criterion	B	SE B	$\beta$	p
Step 1					
Presence	Flow	.28	.09	.34	.00**
Step 2					
Presence	Enjoyment	.26	.09	.33	.01**
Step 3					
Presence	Enjoyment	.14	.09	.18	.11
Flow	Enjoyment	.45	.11	.46	.00**

Note.  $R^2 = .12$  for Step 1;  $R^2 = .11$  for Step 2;  $\Delta R^2 = .30$  for Step 3  
\*\* $p < 0.01$

**Conclusions**

Presence and flow seem to be two distinct constructs. The findings suggest that immersion into computer games is after all a result of experiences of flow and the presence subdimension arrival. Departure seems – at least in the actual experimental setting – not to play an important role.

Within our experiment, flow mediates the connection between presence and flow. Thus, the experience of being immersed in a VE facilitates the occurrence of a mental state of operation in which a person is highly involved in playing.

There are some limitations concerning this study. Thus, the number of participants was rather low for a factor analysis performed on 18 items. Furthermore, to draw hard conclusions regarding the observed mediation, additional analyses for other settings should be conducted.

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