

Presence, flow, and narrative absorption questionnaires: a scoping review

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1. Title

Presence, flow, and narrative absorption questionnaires: a scoping review

2. Abstract

This is a review and analysis of the questionnaires most used in empirical research about psychological phenomena labelled as “presence,” “flow,” and “narrative absorption,” mostly for experiences mediated by technology (printed books, screens for games and films, and virtual reality). The items of each questionnaire are categorized based on their wordings, thus independently from the conceptual models within which they have been developed. Overlapping concepts have been formulated in different fields according to specific disciplinary interests and based on knowledge within each field, this review focuses on how language is actually used in questionnaire items, rather than on how concepts are formulated top-down and arbitrarily associated with corresponding linguistic expressions that become items of a questionnaire. The goal is to highlight similarities and overlaps in order to show the aspects for which an interdisciplinary dialogue could bring concrete improvements to different research fields. Based on this categorization, various domains to which the items can be ascribed are identified (e.g. space, realism, agency, etc.) and psychological phenomena are linked to them (e.g. presence, social presence, narrative absorption, etc.). In the end, a synthetic selection of items is presented for each construct.

Keywords: Presence; flow; narrative absorption; immersion; scoping review; questionnaires.

Introduction

3. Rationale

Experiences mediated by technology (e.g. printed books, screens, and virtual reality) are studied across a variety of disciplines, often with little cooperation. Different theorizations, models, and empirical tools have been developed, resulting in a fuzzy agglomerate of related and overlapping concepts, like presence (Lombard et al., 2015), flow (Csikszentmihalyi, 1990; Harmat et al., 2016), and narrative absorption (Hakemulder et al., 2017). In order to identify the core aspects of these various concepts, a scoping review of the questionnaires most used in empirical research about this kind of psychological phenomena has been performed. Items of each questionnaire have been categorized based on their wordings, thus independently from the conceptual models within which they have been developed. Overlapping concepts have been formulated in different fields according to specific disciplinary interests and based on knowledge within each field, this review focuses on how language is actually used in questionnaire items, rather than on how concepts are formulated top-down and arbitrarily associated with corresponding linguistic expressions that become items of a questionnaire.

4. Objectives

The goal is to highlight similarities and overlaps between questionnaires' items in order to identify which are the most relevant aspect of the psychological phenomena labelled as “presence,” “flow,” and “narrative absorption.” Based on this categorization, the domains to which each group of items can be ascribed (e.g. space, realism, agency, etc.) will be

suggested and they will be associated to the respective psychological phenomena for which they are more frequently used (e.g. presence, social presence, narrative absorption, etc.).

Methods

5. Protocols and registration

The review follows the Arksey and O'Malley's framework for scoping reviews (Arksey & O'Malley, 2005), refined by Levac et al. (2010) and the Joanna Briggs Institute (Peters et al., 2015). Findings are reported following the PRISMA-ScR (Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews) checklist (Tricco et al., 2018).

6. Eligibility criteria

The sources considered are questionnaires available in English, no year limit has been used. To be included in the review, questionnaires need to have been developed or used for research about one of the following media: VR, video game, film, book. Only questionnaires measuring psychological states have been included, not those measuring personality traits or broader psychological concept (e.g. empathy). Validation and statistical reliability were not necessary criteria.

7. Information sources

The search has been performed using three sources: the aggregator Google Scholar, the bibliography of the Society for the Empirical Study of Literature and Media (IGEL),¹ and the measurement guides provided by the International Society for Presence Research (ISPR).² Additional useful comparisons of presence-related concepts can be found in van Baren & IJsselsteijn (2004), de Oliveira & Tavares (2016), and Skarbez et al. (2017); for narrative absorption and similar concepts, see Busselle & Bilandzic (2017); for games, see Reddy (2016).

8. Search

Terms' queries used in Google Scholar are: "presence questionnaire," "immersion questionnaire," "flow questionnaire," "narrative questionnaire," "narrative engagement," "narrative absorption," "narrative transportation."

9. Selection of sources of evidence

Information about questionnaire has been obtained directly from the published articles and also from reviews included in Master theses or PhD dissertations. The criterion used to consider a questionnaire as source of evidence is its application in recent years: once a questionnaire has been identified, its use in research starting from the year 2000 has been checked.

¹ https://www.zotero.org/groups/2082627/igel_bibliography/collections/MKV5U8RJ/items/ENQ266EI/collection

² <https://ispr.info/about-presence-2/tools-to-measure-presence/>

10. Data charting process

When multiple versions of a questionnaire were available, only the most recent or shortest version have been considered, since these are likely to be an improvement over previous or longer versions.

11. Data items

Being a data-driven bottom-up review, no specific variables have been defined a priori. Rather, all questionnaires' items have been analyzed. Among the total 479 items of all questionnaires, I only grouped and categorized the items for which I found close similarities and overlap of wordings (n = 249).

12. Synthesis of results

Items of the selected questionnaires have been compared and grouped according to similarities in the wordings used. For instance, the narrative absorption item "When I was finished with reading the story it felt like I had taken a trip to the world of the story" (Kuijpers et al., 2014) strongly resembles the spatial presence item "After my experience of the displayed environment, I had a sense that I had returned from a journey" (Lessiter et al., 2001). Once various clusters of items have been identified, each group has been labeled and linked to the most relevant psychological phenomenon. When items were already grouped in subdimension of the broader psychological construct, the subdimensions have been used as guidance for the classification.

Results

13. Selection of sources of evidence

The questionnaires analyzed are listed in Table 1. Out of the 23 questionnaires included in the analysis, 8 have been developed to measure presence, 4 for flow, 5 for game immersion/engagement, and 6 for narrative phenomena (absorption, engagement, transportation, immersion, identification with characters, and empathy with characters). Out of the total 479 items, 249 have close similarities and overlapping of wordings.

Table 1

Questionnaires analyzed and categorized. Total number of items, n= 479.

	Questionnaire	Type	Number of items
1	Temple Presence Inventory (TPI) (Lombard et al., 2000)	Presence	42
2	Slater, Usoh and Steed (SUS) (Usoh et al., 2000)	Presence	6
3	Sense of Presence Inventory (ITC-SOPI) (Lessiter et al., 2001)	Presence	38
4	Igroup Presence Questionnaire (IPQ) (T. W. Schubert, 2003)	Presence	14
5	Networked Minds Social Presence Inventory (NMSPI) (Harms & Biocca, 2004)	Presence	34
6	Presence Questionnaire, version 3 (PQ) (Witmer et al., 2005)	Presence	29
7	Spatial Presence Experience Scale (SPES) (Hartmann et al., 2016)	Presence	8
8	Multimodal Presence Scale (MPS) (Makransky et al., 2017)	Presence	15
9	Flow Short Scale (FSS) (Rheinberg, 2008)	Flow	13
10	EduFlow Scale (EFS) (Heutte et al., 2014)	Flow	12
11	Reading Flow Short Scale (RFSS) (Thissen et al., 2018)	Flow	8
12	EGameFlow (EGF) (Fu et al., 2009)	Game/Flow	42

13	Immersion in the Narrative Game Questionnaire (INGQ) (Qin et al., 2009)	Game	27
14	Game Engagement Questionnaire (GEQ) (Brockmyer et al., 2009)	Game	19
15	User Engagement Scale (UES) (O'Brien & Toms, 2013; Wiebe et al., 2014)	Game	31
16	Game Experience Questionnaire (GExQ) (Ijsselstein et al., 2013)	Game	40
17	Game Immersion Questionnaire (GIQ) (Cheng et al., 2015)	Game	14
18	Transportation Scale (Green & Brock, 2000)	Narrative	11
19	Identification Scale (J. Cohen, 2001)	Narrative	10
20	Narrative Engagement Scale (NES) (Busselle & Bilandzic, 2009)	Narrative	12
21	State Empathy Scale (SES) (Shen, 2010)	Narrative	12
22	Story World Absorption Scale (SWAS) (Kuijpers et al., 2014)	Narrative	18
23	Film Immersion Questionnaire (FIQ) (Jennett et al., 2008; Rigby et al., 2019)	Narrative	24

14. Synthesis of the results

The complete categorization of the questionnaire items can be found in an online repository (Pianzola, 2020). A summary of the most frequent categories is reported in Table 2. Attention is undoubtedly the most relevant term for all the constructs considered, conceived as disregard for both thoughts and perceptions that are not part of the activity eliciting presence, flow, or absorption. Similarly, a distorted perception of time is in many cases considered to be a sign of the occurrence of all the considered phenomena. With respect to categories specific to each concept, presence is characterized by items related to space, agency, and a comparison with reality non mediated by technology. Social presence is characterized by the same categories that are relevant for presence (space and agency) but in relation to the existence of other agents; additionally, some kind of cognitive attention to the other and emotional arousal elicited by them are also frequent. Flow is specifically characterized by the perception of a sense of challenge. Narrative absorption is characterized by a comparison with non-mediated reality (in terms of vividness of imagery), by an easy comprehension of content, and by emotions and thoughts anticipating possible outcomes (suspense). Lastly, there are two groups of items explicitly asking about the user's perception of involvement/engagement or absorption/immersion.

Table 2

Categorization of items (n = 249) from presence, flow, game, and narrative questionnaires.

Total items	Scales with item	Item type	Category	Main psychological phenomenon
22	12	Attention (no external thoughts)	Attention	Attention
17	9	Attention (no external perceptions)		
17	11	Time distortion	Time	–
17	9	"Being there" (feelings and perceptions, not thoughts)	Space	Presence
8	5	Realities overlapping		
5	3	Closeness of story world		
6	5	Return to reality		
5	5	Being part of the action (also partly overlaps with "being there")		
10	5	Possibility of action in space	Agency	
6	4	Control of content		
5	3	Control of medium		
9	6	Naturalness/fluency of medium use		
9	6	Perceived realism	Comparison	
4	2	Attention to another agent	Attention	Social presence
4	3	Co-location with another agent	Space	
9	3	Mind reading	Cognition	

5	2	Behavioral response to another agent	Agency	
14	7	Matching of another agent 's emotions	Emotion	
4	3	Feelings for another agent	Emotion/Cognition	
5	4	Connection with another agent	Emotion/Cognition	
9	5	Understanding of another agent (perspective taking, cognitive empathy)	Cognition	
10	6	Challenge	Cognition	Flow
8	4	Vividness of imagery	Comparison	Narrative absorption
12	5	Comprehension of content	Comprehension	
7	4	Suspense/anticipation	Emotion/Cognition	
13	7	Explicit use of involvement/engagement terms	Metaphor	–
9	8	Explicit use of absorption/immersion terms		

Discussion

15. Summary of evidence

In all questionnaires, the most frequently recurring items concern attention and the sense of time. The isolation from external thoughts and perceptions is the main characteristic of presence-related phenomena, and such disconnection from stimuli unrelated to the undergoing experience leads probably to an alteration of the sense of time. Despite the evolution towards broad psychological conceptions of presence (Baños et al., 2000; Lee, 2004; Riva et al., 2015), a review (Hein et al., 2018) of the psychometric questionnaires used in VR research in the years 2016-17 found that the most used one is the Presence Questionnaire (Witmer & Singer, 1998), which heavily focuses on visual realism and naturalness of interaction. However, the broadest and most protracted collective effort aimed at clarifying how to measure presence (Hartmann et al., 2016; Vorderer et al., 2004) has excluded realism from the subdimensions of presence, keeping only “self-location” and “possible action” as core dimensions. Indeed, these two categories seem to be the two really specific to presence, since a comparison with non-mediated reality is also relevant for the “imagery” category, which concerns items related to narrative absorption. Inquiring about the vividness of imagery or about the realism of a VR scene is a way to check how similar the imagined/mediated experience is to a non-mediated one. Both realism and vivid imagery are outcomes that can be associated to presence, but they are not particularly helpful to explain the underlying psychological processes that bring to the emergence of a sense of presence. Many questionnaires also take into account the possibility that perceiving the existence of other agents can affect our sense of presence or, more broadly, that we can have intense experiences when interacting with others or following their actions. With a growing degree of complexity, such perception goes from merely noticing the existence of others, to interacting with them, to emotional and cognitive ways of responding to and understanding others’ mental states. These groups of items, that I have associated to the concept *social presence*, often occur together with presence items and seem to entail it as the basis on top of which they can emerge. Indeed, they are all different expressions of a Self-Other relationship and can be conceptualized as forms of presence in co-participation. Analogously, questionnaires about flow experiences include items that I have here associated to presence – and in some cases also items related to social presence – plus a specific group of questions regarding the perception of an experience as challenging. Similar wordings can be also found in items of narrative and game questionnaires.

Items that I specifically associated to the concept of narrative absorption regard imagery, the feeling of suspense triggered by the narrated events, and the comprehension

of the content of the story, an aspect which can be connected to the sense of challenge of flow experiences, since the right match between the complexity of a story and the cognitive skills of the reader is relevant for narrative absorption. It is worth noting that questionnaires investigating narrative absorption include these three groups but also items related to presence and social presence (with characters of a story), which can be considered subdimensions of narrative absorption. Given their metaphorical nature, items explicitly asking whether an experience elicited involvement, engagement, immersion, or absorption are not particularly useful for describing the psychological processes activated during the experiences they aim at qualifying. Moreover, “immersive” is used in VR research as a technical attribute of the medium – consistently with Sheridan seminal definition (1992) – whereas in game and narrative studies it is a quality of the player or reader’s experience (Jennett et al., 2008; Ryan, 2015; Stockwell 2019).

Based on the recognition presented, a cross-disciplinary systematization of concepts is possible. To sum up, attention and time distortion are common to all the considered phenomena, and presence (space and agency) is the phenomenon with the narrowest scope, the core. Social presence and narrative absorption are phenomena of increasingly broader scope, each of them including the phenomena of narrower scope. Flow is a concept transversal to the other three, being more related to the balance between a person’s skills and the complexity of the stimulus, rather than to a specific psychological dimension.

16. Conclusions

The categorization proposed here can be used to further refine existing questionnaires and possibly encourage a convergence of different disciplines towards a use of the same items, so that insight coming from different fields could be used for the advancement of knowledge in specific areas. For instance, empirical research on narrative could benefit from using existing items for presence and social presence, without “reinventing the wheel” and focusing rather on refining how to measure dimensions like suspense and imagery. Moreover, a shared agreement on basic items will enable better and more informative meta-analyses, as well as comparative media studies, a kind of research that is strongly relevant for all the disciplines that I mentioned here, since only a comparison between experiences with different media can help to account for the specificity of presence and related phenomena.

Following the above-mentioned strategy, in Tables 3 and 4 I present my suggestion for a selection of items to be used to measure presence, social presence, and narrative absorption, with the aim of achieving a more solid epistemic comparability among research on these themes. In order to benefit from previous statistical validations, in case of similarities, I gave preference to items coming from the same questionnaire. Depending on the task/content with which the participants are engaging, only a part of these items may be relevant.

Table 3

Selection of questionnaires' subdimensions recommended to achieve a more solid epistemic comparability among research on presence, social presence, and narrative absorption.

Item type	Category	Recommended questionnaire subdimension	Main psychological phenomenon
Attention (no external thoughts)	Attention	NES by Busselle and Bilandzic (2000) – “Attentional focus”	Attention
Attention (no external perceptions)		PQ v.3 by Witmer et al. (2005) – “Adaptation/Immersion” / FIQ by Rigby et al. (2019) – “Real-world Dissociation”	
Time distortion	Time	Various	–
“Being there” (feelings and perceptions, not thoughts)	Space	SPES by Hartmann et al. (2016) – “Self-location”	Presence
Realities overlapping			
Closeness of story world	Agency	SPES by Hartmann et al. (2016) – “Possible action”	
Return to reality			
Being part of the action (also partly overlaps with “being there”)	Agency	SPES by Hartmann et al. (2016) – “Possible action”	
Possibility of action in space			
Control of content	Agency	SPES by Hartmann et al. (2016) – “Possible action”	
Control of medium			
Naturalness/fluency of medium use			
Attention to another agent	Attention	NMSPI by Biocca and Harms (2003) – “Perceived Attentional Engagement”	
Co-location with another agent	Space	MPS by Makransky et al. (2017) – “Social presence”	
Mind reading	Cognition	NMSPI by Biocca and Harms (2003) – “Perceived Behavioral Interdependence”	Social presence
Behavioral response to another agent	Agency	NMSPI by Biocca and Harms (2003) – “Perceived Emotional Contagion” / SES by Shen (2010) – “Affective empathy”	
Matching of another agent 's emotions	Emotion	NMSPI by Biocca and Harms (2003) – “Perceived Comprehension” / SES by Shen (2010) – “Cognitive empathy”	
Feelings for another agent	Emotion/Cognition		
Connection with another agent	Emotion/Cognition		
Understanding of another agent (perspective taking, cognitive empathy)	Cognition		
Challenge	Cognition	RFSS by Thissen et al. (2019) – “Absorption”	Flow
Vividness of imagery	Comparison	SWAS by Kuijpers et al. (2014) – “Mental imagery”	
Comprehension of content	Comprehension	NES by Busselle and Bilandzic (2000) – “Narrative understanding”	Narrative absorption
Suspense/anticipation	Emotion/Cognition	Transportation Scale by Green and Brock (2000) – “Transportation”	

Table 4

Selection of questionnaires' items (with minimal adaptation) recommended to achieve a more solid epistemic comparability among research on presence, social presence, and narrative absorption. (R = reverse scored).

	Item	Item type	Recommended questionnaire subdimension	Main psychological phenomenon
1	While [task/content] I found myself thinking about other things. [R]	Attention (no external thoughts)	NES by Busselle and Bilandzic (2000) – “Attentional focus”	Attention
2	I had a hard time keeping my mind on the [task/content]. [R]			
3	I was able to concentrate very well on [task/content] rather than on the mechanisms used to [perform/represent] that [task/content].	Attention (no external perceptions)	PQ v.3 by Witmer et al. (2005) – “Adaptation/Immersion” FIQ by Rigby et al. (2019) – “Real-world Dossociation”	
4	I didn't notice events taking place around me.			
5	I lost track of time.	Time distortion	Various	
6	I felt like I was actually there in the environment of the presentation.	Self-location	SPES by Hartmann et al. (2016) – “Self-location”	Presence
7	It seemed as though I actually took part in the action of the presentation.			
8	It was as though my true location had shifted into the environment in the presentation.			
9	I felt as though I was physically present in the environment of the presentation.			
10	The objects in the presentation gave me the feeling that I could do things with them.	Possible action	SPES by Hartmann et al. (2016) – “Possible action”	
11	I had the impression that I could be active in the environment of the presentation.			
12	I felt like I could move around among the objects in the presentation.			
13	It seemed to me that I could do whatever I wanted in the environment of the presentation.	Attention to another agent	NMSPI by Biocca and Harms (2003) – “Perceived Attentional Engagement”	
14	I paid close attention to [other agent/s].			
15	I was easily distracted from [other agent/s] when other things were going on. [R]	Co-location with another agent	MPS by Makransky et al. (2017) – “Social presence”	
16	I felt like I was in the presence of someone else while [task/content].			
17	I felt that the [other agent/s] in [place] were aware of my presence.	Mind reading		
18	The [other agent/s] in [place] appeared to be sentient (conscious and alive) to me.			
19	My actions were often dependent on [other agent/s'] actions.	Perceived Behavioral Interdependence	NMSPI by Biocca and Harms (2003) – “Perceived Behavioral Interdependence”	Social presence
20	My behavior was often in direct response to [other agent/s'] behavior.			
21	What [other agent/s] did often affected what I did.			
22	I was sometimes influenced by [other agent/s'] moods.	Affective empathy	NMSPI by Biocca and Harms (2003) – “Perceived Emotional Contagion” SES by Shen (2010) – “Affective empathy”	
23	I experienced the same emotions as the [other agent/s] while [task/content].			
24	I could feel the [other agent/s'] emotions.			
25	I was able to understand what [other agent/s'] meant.	Understanding of another agent (perspective)	NMSPI by Biocca and Harms (2003) – “Perceived Comprehension”	
26	I can see the [other agent/s'] point of view.			

27	I can understand what the [other agent/s'] was going through.	taking, cognitive empathy)	SES by Shen (2010) – “Cognitive empathy”	
28	I felt optimally challenged while [task/content].	Challenge	RFSS by Thissen et al. (2019) – “Absorption”	Flow
29	When I was reading the story, I had an image of the main character in mind.			
30	When I was reading the story, I could see the situations happening in the story being played out before my eyes.	Vividness of imagery	SWAS by Kuijpers et al. (2014) – “Mental imagery”	
31	I could imagine what the world in which the story took place looked like.			Narrative absorption
32	At points, I had a hard time making sense of what was going on in the story. [R]	Comprehension of content	NES by Busselle and Bilandzic (2000) – “Narrative understanding”	
33	I wanted to learn how the story ended.	Suspense/anticipation	Transportation Scale by Green and Brock (2000) – “Transportation”	

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