

German Translation of the Multimodal Presence Scale

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Abstract

Presence is a key variable in virtual reality. A differentiated assessment of presence is necessary to compare different versions of VR environments. The Multimodal Presence Scale (MPS) by Makranksy, Lilleholt, and Aaby (2017) was developed to measure physical, social and self-presence. However, the scale is not yet available in German. We provide a precise translation of the scale and first indicators of its reliability, especially in the context of assessing social presence, an increasingly important aspect of presence.

1 Introduction

Supported by more powerful hard-/software and more powerful tools, simulation environments have become increasingly realistic. The drop in price and the availability of consumer grade technology make VR simulations available to a broad audience (Kushner, 2014; Simone, Velloso, & Gellersen, 2015). Additionally, the release of consumer grade head mounted displays and its adaption by a wide audience has stimulated interest in research — and new tools and techniques for development and evaluation arise (Anthes, García-Hernández, Wiedemann & Kranzlmüller, 2016; Mottelson & Hornbæk, 2017).

One of the key variables in VR is *presence*, often generalized as “sense of being there” (e.g. Heeter, 1992). Given the increasing availability of VR and plans to use VR in social interaction, specific aspects of presence become more important. In addition to the physical sense of being there, the sense of being there with others (social presence) and the sense of being actually represented (self-presence) are also important. Especially social presence is crucial, as the human desire to communicate irrespective of social, temporal or local borders has always been a driving force for developing new technology (Anthes et al., 2016; Biocca, Harms, & Bur-

goon, 2003) and will likely continue to stimulate VR development. Additionally, when communication between humans and virtual representations (i.e. social bots, personal assistants) is used, these representations are often designed to mimic realistic human behavior (Chartrand & Bargh, 1999; Lee & Nass, 2003), with social presence being an important factor for communicative success.

Thus, presence should be assessed more specifically than just "being there" and especially include specific dimensions like the "sense of being with another" (i.e. social presence). Widely used and adapted questionnaires like the Presence Questionnaire by Witmer and Singer (Witmer & Singer, 1998) do not explicitly address social aspects and have been criticized for it (Lessiter, Freeman, Keogh, & Davidoff, 2001).

An important distinction between presence facets goes back to Lee (2004), who defined the already mentioned three subtypes of presence: physical, social and self-presence. Based on Lee's theoretical framework, Makransky, Lilleholt, and Aaby (2017) recently developed and validated the Multimodal Presence Scale (MPS). The questionnaire scale consists of 15 items, five each assessing physical, social, and self-presence. The authors concluded that "different results might be expected across different VR environments. Future research is thus needed to investigate whether the scale would function equally well in a different context [...] and across different languages" (Makransky et al., 2017, p.9).

In the present paper, we act on this conclusion and conduct a precise translation to provide a German version of the MPS that is comparable to the original published English version and can be used by other researchers. Further, we also provide first data on the reliability of the German scale.

2 Translation Procedure

To create the German version of the Multimodal Presence Scale (Makransky et al., 2017), the items were independently translated by four researchers from the field of HCI and psychology. The translations were integrated into one main version by one academic researcher and reviewed by the translators. Finally, the integrated questionnaire translation was reviewed and revised with the help of a native bilingual speaker who is also a researcher in the field of psychology. For the final version see Table 1. The original items are available in Makransky et al. (2017).

Nr.	German Translation
Physical Presence	
1	Die virtuelle Umgebung erschien mir real.
2	Ich hatte das Gefühl, in der virtuellen Umgebung zu agieren, anstatt etwas von außen zu kontrollieren.
3	Mein Erleben in der virtuellen Umgebung erschien konsistent mit meinem Erleben in der realen Welt.
4	Während ich in der virtuellen Umgebung war, hatte ich ein Gefühl des 'Dort-Seins'.
5	Ich war komplett gefesselt von der virtuellen Welt.

Social Presence	
6	Ich habe mich in der virtuellen Umgebung gefühlt, als wäre ich in der Gegenwart einer anderen Person.
7	Ich hatte das Gefühl, dass sich die Menschen in der virtuellen Umgebung meiner Anwesenheit bewusst waren.
8	Die Menschen in der virtuellen Umgebung wirkten auf mich wie fühlende Wesen (mit Bewusstsein, lebendig).
9	Während der Simulation gab es Momente, in denen das Computerinterface zu verschwinden schien, und ich das Gefühl hatte, direkt mit einer anderen Person zu arbeiten.
10	Ich hatte das Gefühl mit anderen Personen in der virtuellen Umgebung zu interagieren statt mit einer Computer-Simulation.
Self-presence	
11	Ich habe mich gefühlt, als sei mein virtueller Körper eine Erweiterung meines echten Körpers innerhalb der virtuellen Umgebung.
12	Wenn etwas mit meiner virtuellen Verkörperung passierte, fühlte sich das an, als würde es meinem echten Körper passieren.
13	Es fühlte sich an, als würde mein echter Arm durch meine virtuelle Verkörperung in die virtuelle Umgebung projiziert.
14	Es hat sich angefühlt, als wären meine echte Hand in der virtuellen Umgebung.
15	Während der Simulation fühlte ich mich, als würden meine virtuelle Verkörperung und mein realer Körper ein und dasselbe werden.

Table 1: Translated Multimodal Presence Scale

3 First Indicators of Reliability (Internal Consistency)

While a complete validation of the German scale is beyond the scope of this paper, we applied the German MPS in a first experiment ($n = 45$, within-subjects design). This experiment examined VR environments that were designed to elicit different levels of social presence (three experimental conditions: low, medium, and high quality of representation of social interaction partner). With the exception of two of the 9 reliability values (see Table 2), the subscales and the total scale achieved good reliability (Cronbach's $\alpha > .8$, i.e., good according to common practice, e.g. Cripps, 2017) in each of the three experimental conditions. Only for physical presence in two experimental conditions, Cronbach's α values were .69 (questionable) and .75 (acceptable). First results also indicate the scale is useful in differentiating between different aspects of presence and is sensitive in detecting changes on at least the examined social presence dimension. Additionally, no ceiling or floor effects could be found on any of the three dimensions.

Condition	physical presence		social presence		self-presence	
	M (SD) Range	Cronbach's α	M (SD) Range	Cronbach's α	M (SD) Range	Cronbach's α
1	3.15 (0.88) 1.2 — 5.0	.82	1.67 (0.76) 1.0 — 4.0	.88	2.93 (0.96) 1.0 — 4.8	.89
2	3.40 (0.73) 1.6 — 4.6	.75	2.16 (0.84) 1.0 — 4.0	.86	3.01 (0.85) 1.0 — 4.4	.84
3	3.54 (0.71) 1.4 — 5.0	.69	2.61 (1.04) 1.0 — 4.6	.89	3.00 (1.00) 1.2 — 4.8	.89

$n = 45$. For comparison, the Cronbach's alpha values for the original scale (Makransky et al., 2017) were (study 1 and study 2): physical (.84 and .86), social (.83 and .90), and self-presence (.93 and .94).

Table 2: Statistical values for the subscales of MPS in the three conditions.

4 Discussion and Future Research

The German translation provides a reliable assessment of the social presence within the three dimensions of the Multimodal Presence Scale — physical, social, and self-presence. The scale seems especially useful to detect the effect of changes to the VR environment on specific aspects of presence. However, further studies are necessary to validate the translation.

As a first study varying the degree of social presence provided encouraging results. Further validations of the German MPS scale (and the English version) should independently vary the three dimensions to assess the sensitivity of the scale to detect these changes. Suggested variations are shown in Figure 1, with the variation of the social dimension already used in a first study (publication in preparation).

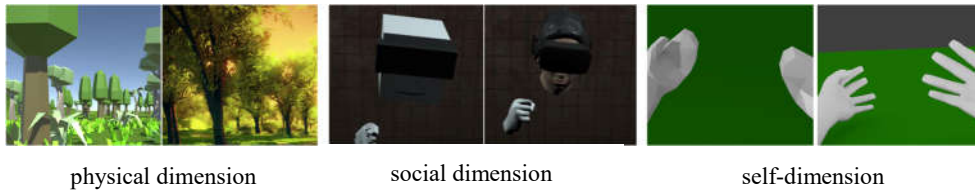


Figure 1: Suggested variations of each dimension to measure presence, rendered in the Unity game engine

Further studies should also provide more detailed scale characteristics, especially a validation of the factorial structure of the MPS.

At the moment, however, the German MPS with its physical, social, and self-dimensions of presence provides an economical, yet differentiated assessment of presence for use in German VR research.

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