Experiencing narrative worlds: A latent state-trait analysis

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Highlights

- Transportation reflects the degree to which individuals get absorbed in a story.
- Latent state trait analyses studied situation and trait aspects of transportation.
- Situational differences accounted for 34% to 69% of the observed score variance.
- An experimental manipulation of the story structure affected transportation.
- An experimental manipulation of argument strength did not affect transportation.

Abstract

Transportation describes the degree to which individuals get absorbed in the fictional world of a story. Although conceived as a psychological state evoked by the processed narrative, it has also been associated with trait-like characteristics. An experimentally enhanced latent state-trait (LST) model was used to assess the degree to which transportation reflects (a) stable individual differences, and (b) systematic situational effects and/or person-situation interactions. After reading each of four stories 149 undergraduates rated their degree of being transported into the respective narratives. The contents of the stories were experimentally varied to (a) either facilitate or hinder transportation, and (b) present strong or weak arguments for the idea put forward in the stories. The LST analyses and experimental manipulations concordantly revealed that transportation captures pronounced situational effects related to the presented stories and to some degree also interindividual differences. In line with transportation theory, argument strength had no effect on the state component of transportation.

Keywords: immersion, narrativity, argument strength, state, trait, transportation

Experiencing narrative worlds: A latent state-trait analysis

When individuals read a short story or novel or follow a feature film or a TV-documentary, they often leave their own everyday world behind and get lost in the story world. Stories can take us to remote places—or as Emily Dickinson (1894) put it—“There is no frigate like a book”. The arguably most popular concept to capture the experience of being immersed into a narrative world is *transportation* (Gerrig, 1993; Green & Brock, 2000), which has instigated hundreds of articles in recent years (cf. Van Laer, de Ruyter, Visconti, & Wetzels, 2014). Transportation is conceived of as a psychological state with substantial intraindividual and interindividual differences. This state is supposed to depend on the reading situation (including story characteristics, reading goals, etc.) but stable interindividual differences in experiencing transportation have also been discussed (e.g., Appel & Richter, 2010; Green & Brock, 2002). To date, little is known about the amount of variance in being transported into narrative worlds that is due to stable individual differences (trait) and the amount of variance due to reading the particular narrative (state). Based on the latent state-trait (LST) methodology (Steyer, Schmitt, & Eid, 1999) this paper presents an experimental study aimed at identifying the contribution of trait and situational factors to the experience of being transported into narrative worlds.

Transportation into Narrative Worlds

A growing body of empirical literature has highlighted the real-world implications stories can have, even when they are explicitly introduced as a piece of fiction. Fictional narratives have been shown to change recipients’ knowledge for facts (Marsh, Butler, & Umanath, 2012), their attitudes, beliefs, and behavioral intentions (Appel & Mara, 2013), as well as their self-concept (Richter, Appel, & Calio, 2014), and their theory of mind (Kidd & Castano, 2013). The influence of stories has often been attributed to recipients’ deep immersion into the story world. Following Gerrig (1993) this experience has been termed *transportation*, an “integrative melding of attention, imagery, and feelings, focused on story events" (Green & Donahue, 2009, p. 241). Transportation is widely considered to be a psychological state that depends on specific situational factors such as the text or media product encountered (e.g., Gerrig, 1993; Green & Brock, 2002). Stories that are well-crafted, that include certain schematic elements (e.g., setting, event, attempt, reaction, and consequence), and that report on events that are worth telling are rather likely to elicit transportation (more detailed: Bruner, 1991). In previous research transportation was, for example, successfully manipulated by preserving versus mixing up the story structure (Wang & Calder, 2006). Other story manipulations such as different reading goals (e.g., proofreading versus regular reading; Green & Brock, 2000) or advance information on the fictionality of a story (fact vs. fiction labeling; cf., Appel & Malečkar, 2012) showed inconsistent effects on transportation.

At the same time, individuals are assumed to differ in their propensity to become transported into story worlds. Several studies have shown that individuals with higher scores on the need for affect, a general disposition to approach or avoid emotion-inducing situations, experience more transportation (Appel & Richter, 2010; Appel, Gnambs, & Maio, 2012). Transportation has also been linked to individual differences in trait empathy and trait absorption (Green & Donahue, 2009). Related research focused on an *immersive tendency* measure which was positively related to the Big Five dimensions of openness, neuroticism, and extraversion (Weibel, Wissmath, & Mast, 2010). This led some authors to speculate about a general trait *transportability* that might capture individual differences in becoming transported into narrative worlds (e.g., Bilandzic & Busselle, 2008; Mazzocco et al., 2010). So far, most research typically focused on either situational factors or traits as antecedents of the transportation experience but not on both—the relative contribution of each factor has not been explored.

Recent research has also emphasized the importance of transportation for persuasion and attitude formation (e.g., Escalas, 2004; Praxmarer, 2011; Van Laer et al., 2014). When people are highly transported in a story, they process its content without great scrutiny and do not invest much effort in carefully evaluating the presented arguments (Lien & Chen, 2013)—even when the arguments are inconsistent with prior beliefs (Slater & Routner, 2002). Rather, transportation involves affective responses and changes attitudes by boosting positive feelings (Chang, 2009; Escalas, 2004). Therefore, most research on narrative persuasion assumes that transportation and cognitive elaboration represent two distinct routes toward persuasion (e.g., Green & Brock, 2002). However, the independence of the transportation experience from the persuasive quality of the story content, that is the strength of the presented arguments, has not yet been examined.

Study Overview

Transportation theory and research suggests that the experience of being transported into a narrative world is a function of both, the situation (including the text being read or the TV series being watched, etc.) and a rather stable propensity to become immersed in story worlds. The aim of the present work is to disentangle situation and trait aspects by means of an LST analysis (Steyer et al., 1999). This method allows us to distinguish between a) the variance that is due to a latent trait, b) variance due to situational (textual) differences and related interactions as well as c) error variance. We expected that transportation comprises substantial situation variance but we also expected at least some amount of trait variance. Because there are arguably as many different situations to elicit transportation as there are stories written (from a Stephen King page-turner to experimental prose written by a high school student) we combined the LST model with an experimental design by manipulating the situational narrativity of the chosen texts, which has been shown to be crucial for the transportation experience (Wang & Calder, 2006). To demonstrate that transportation does not result from an analytical processing of the narrative's content, we further manipulated the strength of arguments woven into the story, which—according to transportation theory—should have limited or no effects on transportation itself (Green & Brock, 2000).

Method

Participants and Procedure

Undergraduates from a midsized Austrian university participated in a web-based experiment for partial course credit. After exclusion of six respondents with poor language proficiency in German the final sample included 149 students (87 women). Their mean age was 23.61 years (*SD* = 4.46). All participants were administered the questionnaire which included four stories, each followed by the transportation measure.

Stimulus Texts and Experimental Manipulation

Each participant read four short stories (610-732 words). The first story featured a patient in a hospital falling in love with a woman over the Internet. The second story was about a young woman interviewing an opera singer. Story three featured a young woman and man meeting for a blind date in a public park. The fourth story described the car ride of a young couple going on holidays. Each of the stories was written in an entertaining manner and featured a surprising turn of events. For each story, four different versions were developed, following a two-factorial (2x2) experimental design. The first factor was the narrativity of the story. In the low narrativity condition, the sections of the story were mixed up in order to disrupt the narrative flow, whereas in the high narrativity condition, the story flow remained intact (cf. Wang & Calder, 2006). The second manipulated factor was the strength of arguments put forward in the story. All stories incorporated a section in which the main characters discussed a belief-relevant topic (the benefits of saving energy, the risks of fake perfume, the mandatory use of dog leashes, or the healthiness of smoothies) using either all weak or all strong arguments. The strength of the included arguments was pretested in a pilot study. The participants read all of the four different stories in a random order, each story with a different combination of the 2 (narrativity) x 2 (argument strength) story factors. The story-factor combinations for each participant were randomly assigned so that each participant read only one version of each story.

Transportation Measure

The state of being immersed in a narrative world was measured with a short form of the Transportation Scale (Green & Brock, 2000). The six items short form (TS-SF) includes only items with a strong relationship to a general transportation factor and has been validated in a series of studies (cf. Appel, Gnambs, Richter, & Green, 2014). This scale consists of self-report items that are focused on the experience during reading (see the Online Supplement for the full scale). After each of the four narratives, the TS-SF was presented, that is, the respondents provided four ratings on the TS-SF. The items were accompanied by seven-point response scales ranging from 1 (not at all) to 7 (very much). Scores for each participant were created by averaging the item responses for each measurement occasion. The scale resulted in satisfactory coefficient alpha reliabilities with a median of .84 (see Table 1).

Statistical Analyses

Each participant provided four transportation scores, one for each narrative, which form a multilevel structure, that is, the four scores are nested within persons: Level 2 represented the 149 participants, whereas Level 1 comprised the 4 x 149 = 596 TS-SF scores provided by all respondents. Thus, the effects of the experimental manipulations on the observed transportation scores were examined using mixed effects regression analyses with a restricted maximum likelihood estimator (Pinheiro & Bates, 2009) by regressing the transportation scores on the effect-coded indicators of the stories' narrativity (low = -1 versus high =1), argument strength (low = -1 versus high = 1), and their interaction. The intercept was allowed to randomly vary between persons whereas narrativity, argument strength and their interaction were included as fixed effects. To facilitate interpretation we repeated these analyses with the *z*-standardized transportation scores. The fixed-effects parameters from these models can be interpreted similarly to ordinary regression analyses as standardized effects.

The LST analysis (Steyer et al., 1999) decomposed the variance of the observed transportation scores into variance due to stable individual differences (trait component), variance due to the current measurement occasion (state component—which also includes variance due to interactions between measurement occasion and trait), and error variance. The LST model applied in the present study is presented in Figure 1. To create more parsimonious measurement models we did not analyze individual item scores of the TS-SF but created two test halves (item parcels) that formed our indicators of the latent transportation construct at each measurement occasion (H_{1k} and H_{2k}). Following Steyer et al. (1999) the LST model specified a single latent trait factor (T) common to all indicators that represents stable individual differences between respondents independent of the respective measurement occasion. Moreover, four latent state factors (S_k) common to the two indicators of a specific measurement occasion were included. The four latent state factors represent the degree of interindividual differences in occasion-specific influences. In addition, we also included an indicator-specific trait factor (T_{is}) that captures stable trait variance unique to the second test half which is not shared with the first test half (cf. Geiser & Lockhart, 2012). The trait, state, and residual variances were specified to be uncorrelated. Thus, the LST model presented in Figure 1 estimates four focal variance components: common trait variance (T), indicator-specific method effects (T_{is}), state variance (S_k), and error variance. For the present investigation the state component S_k is of focal interest because the TS-SF is supposed to measure primarily state-specific effects related to a specific narrative. From these variance estimates several coefficients can be derived that reflect the amount of observed variance in an indicator determined by the different latent factors: (a) *Reliability* is the amount of variance in an observed variable not attributable to measurement error and represents stable (T, T_{is}) as well as occasion-specific (S_k) interindividual differences. (b) *Consistency* quantifies effects of stable individual differences and represents the amount of variance in observed scores due to T and T_{is}. (c) *Specificity* indicates the state effect and represents the proportion of variance in observed scores resulting from occasion-specific interindividual differences. All LST models were estimated in Mplus 7 (Muthén & Muthén, 1998-2012) with a robust maximum likelihood estimator.

Results

It was expected that the transportation scores capture a substantial amount of state-specific variance related to the stimulus texts. As a consequence, the transportation scores should exhibit marked differences with regard to the experimental manipulation of narrativity, but not necessarily to the manipulation of argument strength. This hypothesis was examined in two steps. First, the effects of the experimental manipulations on the observed transportation scores were examined using mixed effects regression analyses (Pinheiro & Bates, 2009). Second, an LST analysis (Steyer et al., 1999) is presented that decomposes the observed transportation scores into two variance components: variance specific to a measurement occasion and variance due to stable individual differences.

Mixed Effects Regression Analyses. Prior to testing the hypothesized mixed effects model, a null-model without predictors was estimated to determine the presence of within-individual variance. The null-model was used to estimate the proportions of between- ($\delta^2_b = 0.56$) and within-individual variance ($\delta^2_w = 1.22$), both of which were significantly different from zero ($p < .001$). Moreover, the intraclass correlation was .32, indicating that 32% of the total variability in the responses was between individuals and 68% was within individuals. Thus, the transportation scores varied primarily between the experimental conditions and to a lesser degree between the individual participants.

In the next step, the effect-coded indicators for the two experimental variables and their interaction were included. As predicted, there was a significant main effect of the story's narrativity, $B = 0.36$ ($SE = .04$), $\beta = .53$, $p < .001$. Highly narrative stories resulted in higher levels of transportation than stories low on narrativity (see Figure 2). Argument strength, in contrast, had no main effect, $B = -0.07$ ($SE = .04$), $\beta = -.10$, $p = .10$; neither was the interaction of the two variables significant, $B = 0.06$ ($SE = .04$), $\beta = .09$, $p = .13$. Thus, as expected, the observed transportation scores were sensitive to the narrativity manipulation, with highly narrative stories resulting in higher scores, but not to the manipulation of argument strength. The random variance component ($\delta^2_b = 0.61$) remained significant, $\chi^2(1) = 92.80$, $p < .001$, indicating that the four stories elicited different experiences of being transported into the narrative worlds even after controlling for the experimental manipulations.

Latent State-Trait Analyses. The LST framework allows examining to what degree observed measurements capture variable states or, rather, enduring traits. To this end, the observed transportation scores were decomposed into four state-specific components that resulted from reading the four narratives and a general trait component representing stable individual differences between respondents that were independent of the respective narratives. The LST model is presented in Figure 1 and the goodness of fit indices of several increasingly restrictive LST models are summarized in Table 2. Model M1 that did not include the indicator-specific trait factor T_{is} and, thus, assumed that no method effects are present did not fit the data. Including the method factor T_{is} (model M2) improved the model fit significantly. Next, several more restrictive LST models were examined that tested the measurement invariance of the trait loadings (M3), residual variances (M4), and state variances (M5). Model comparisons (see Table 2) indicated that only M3 assuming measurement invariance with respect to the factor loadings on *T* was supported. Thus, model M3 was the basis for the LST analyses in the next section.

From the variance estimates presented in Figure 1 we estimated the consistency coefficient that quantifies the amount of variance in observed scores due to stable individual differences, and the specificity coefficients reflecting the state effects resulting from occasion-specific individual differences. These coefficients are summarized in Table 3. For transportation as a state concept we expected the specificity coefficients to be rather high. These ranged between .34 and .69; thus, between one and two thirds of the observed score variance could be attributed to the measurement occasion. However, with consistency coefficients between .29 and .56 a substantial proportion of the transportation scores also reflected stable individual differences. Thus, self-reported transportation seems to capture a substantial amount of variance due to varying texts and situations as well as a trait component.

Finally, to replicate the effects of the experimental manipulations, the four latent state factors (S_k) in Figure 1 were regressed on the effect-coded indicators narrativity and argument strength. These latent state regressions replicated the results from the previously presented mixed effects analyses on the observed scores. The narrativity manipulation had significant effects on the first (S_1), $B = 0.31$ ($SE = 0.08$), $\beta = .39$, $p < .001$, the second (S_2), $B = 0.40$ ($SE = 0.09$), $\beta = .41$, $p < .001$, and the third (S_3) latent state variable, $B = 0.52$ ($SE = 0.10$), $\beta = .44$, $p < .001$, whereas the effect on the fourth (S_4) latent state variable marginally failed to reach significance, $B = 0.15$ ($SE = 0.08$), $\beta = .20$, $p = .06$. Argument strength, in contrast, again had no significant effects, $p > .35$ for all statistical tests.

Discussion

People are natural-born storytellers and story recipients. One key characteristic of stories is their propensity to make us leave the actual world behind and become deeply immersed into the story world. The experience of being transported into the story world is an experience that facilitates the effects of stories on attitudes, beliefs, and concepts of oneself (e.g., Appel & Malečkar, 2013; Richter et al., 2014). Theory and research suggests that the experience of transportation is a function of the text or media product but also of stable individual differences. Previous research typically focused on one of these two components, but did not disentangle their relative contribution in a given situation. This study is the first to explicitly investigate trait and situation variance for transportation (or any related concept such as flow, narrative engagement, or presence) by means of a LST analysis. The presented findings empirically support the assumption that the observed transportation scores capture both components. As expected, compared to respective LST analyses for enduring personality traits, the specificity coefficients of state transportation were relatively high and ranged between one and two thirds of the observed score variance. Previous studies on traits such as extraversion, the need for affect, or competitive anxiety yielded specificity coefficients that ranged from 2% to 13% (Appel et al., 2012; Schmukle & Egloff, 2005; Ziegler et al., 2009). Thus, compared to the measurement of typical traits, the measurement of transportation captures state influences to a much larger degree.

Another novel finding of this study pertains to the interplay of transportation and analytical processing of the story content. Contemporary persuasion research (e.g., Green & Donahue, 2009) assumes that transportation and cognitive elaboration represent two independent routes toward attitude and behavior change. However, the independence of these two factors has rarely been scrutinized. In line with these assumptions, the study confirmed that the argument quality contained in the story, a typical determinant of analytical information processing (Lien & Chen, 2013), did not affect the transportation experience, whereas manipulating the coherence of the story structure, a well-established experimental procedure to vary the transportation experience (Green & Brock, 2000; Wang & Calder, 2006), showed the expected effects. This supports the basic notions of dual route persuasion models that view transportation and analytical elaboration as two independent rather than interdependent factors.

The main strength of this study lies in the combination of the LST methodology with an experimental design. Not only did this enable us to disentangle the state and trait variances of transportation, but also to demonstrate that the transportation experience was in fact sensitive to the expected situational manipulations. Despite these contributions, the limitations of the current work need to be noted. First, the presented stories were rather short. Due to restrictions imposed by our repeated measures design, we were unable to present, for example, longer excerpts of novels. The mean transportation scores, however, indicate that the stories were still at least moderately transporting, as compared to prior research (e.g., Appel & Richter, 2010; Green & Brock, 2000). Longer, suspense-inducing narratives would be likely to produce even more pronounced transportation states that might depend to a lesser degree on dispositional individual differences (cf. Mazzocco et al., 2010). Second, the choice of independent variables and operationalizations might have affected the impact of the situation factor and, hence, the outcomes of our LST-analysis. In order to be able to relate our results to previous findings in the field, we chose two theoretically relevant variables as situation factors (narrativity; argument strength) and used standard procedures to experimentally manipulate transportation. These experimental manipulations introduced additional situational variation that affected the estimation of the variance components in our LST analyses (cf. Steyer et al., 1999). Thus, depending on the characteristics of the story the relative contribution of state and trait variances might vary to some degree in other empirical studies. Third, the four stories were presented in one experimental session without a larger in-between time interval. The order of the stories and the experimental conditions was randomized to preclude systematic transfer effects, but we cannot completely rule out the possibility that transportation into one story might have influenced the subsequent transportation experiences.

In conclusion, our study suggests that both state and trait effects in combination determine how strongly individuals experience being transported into the world of a story. These results highlight the need for future research on transportation effects to adopt an integrative perspective that equally acknowledges situational aspects, that is, features of the studied stories, and stable individual differences of the recipient.

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Table 1

Descriptive Statistics by Story and Experimental Condition

Story I: *Hospital*		Argument strength					
		low			high		
		n	*M* (*SD*)	Coefficient α	*n*	*M* (*SD*)	Coefficient α
Narrativity	low	36	4.58 (1.19)	.78 [.48, .90]	36	4.56 (1.31)	.86 [.73, .92]
	high	35	5.46 (0.90)	.66 [.34, .80]	42	5.08 (0.92)	.70 [.54, .80]
Story II: *Interview*		Argument strength					
		low			high		
		n	*M* (*SD*)	Coefficient α	*n*	*M* (*SD*)	Coefficient α
Narrativity	low	36	4.28 (1.67)	.95 [.89, .98]	35	4.17 (1.31)	.84 [.66, .91]
	high	42	4.96 (1.11)	.81 [.51, .90]	36	4.73 (1.35)	.88 [.78, .93]
Story III: *Blind date*		Argument strength					
		low			high		
		n	*M* (*SD*)	Coefficient α	*n*	*M* (*SD*)	Coefficient α
Narrativity	low	35	3.94 (1.24)	.75 [.52, .86]	42	3.27 (1.26)	.86 [.76, .91]
	high	36	4.37 (1.39)	.88 [.78, .92]	36	4.82 (1.34)	.88 [.76, .93]
Story IV: *Car ride*		Argument strength					
		low			high		
		n	*M* (*SD*)	Coefficient α	*n*	*M* (*SD*)	Coefficient α
Narrativity	low	42	4.52 (1.20)	.84 [.71, .90]	36	4.46 (1.34)	.86 [.75, .91]
	high	36	4.93 (1.14)	.78 [.57, .88]	35	5.02 (1.17)	.81 [.55, .90]

Note. Coefficient α with 95% confidence interval (based upon 10,000 bootstrap samples).

Table 2

Goodness of Fit Indices for Latent State Trait Models

		χ^2 (*df*)	CFI	NNFI	RMSEA	Model comparison	$\Delta\chi^2$ (*df*)	BIC
M1:	One trait (T)	61.98 (16)*	.93	.88	.14 [.10, .18]			3560
M2:	M1 with indicator-specific trait (T_{is})	10.82 (15)	1.00	1.00	.00 [.00, .05]	M1 vs. M2	83.76 (1)*	3510
M3:	M2 with measurement invariance of trait (T) loadings	28.05 (22)	.99	.99	.04 [.00, .09]	M2 vs. M3	17.77 (7)	3494
M4:	M3 with measurement invariance of residual variances	52.61 (29)*	.96	.97	.07 [.04, .11]	M2 vs. M4	43.88 (14)*	3483
M5:	M3 with measurement invariance of state (S_k) variances	46.50 (26)*	.97	.97	.07 [.04, .11]	M2 vs. M5	36.70 (11)*	3494

Note. N = 149. Robust maximum likelihood estimation. CFI = Comparative Fit Index; NNFI = Non-Normed Fit Index; RMSEA = Root Mean Square Error of Approximation (with 95% confidence interval); $\Delta\chi^2 = \chi^2$ difference for model comparison; BIC = Bayesian Information Criterion.

* $p < .01$

Table 3

Estimates of Variance Components in the Latent State Trait Model

Indicator	Consistency	Specificity	Reliability
H_{11}	.35	.35	.71
H_{21}	.56	.43	.99
H_{12}	.35	.52	.87
H_{22}	.37	.43	.80
H_{13}	.29	.69	.98
H_{23}	.30	.53	.82
H_{14}	.40	.36	.76
H_{24}	.50	.34	.84

Note. H_{ik} = Test halves (item parcels) with i = test half and k = measurement occasion. In some cases the consistency and specificity coefficients do not add up to the reliability coefficient due to rounding errors.

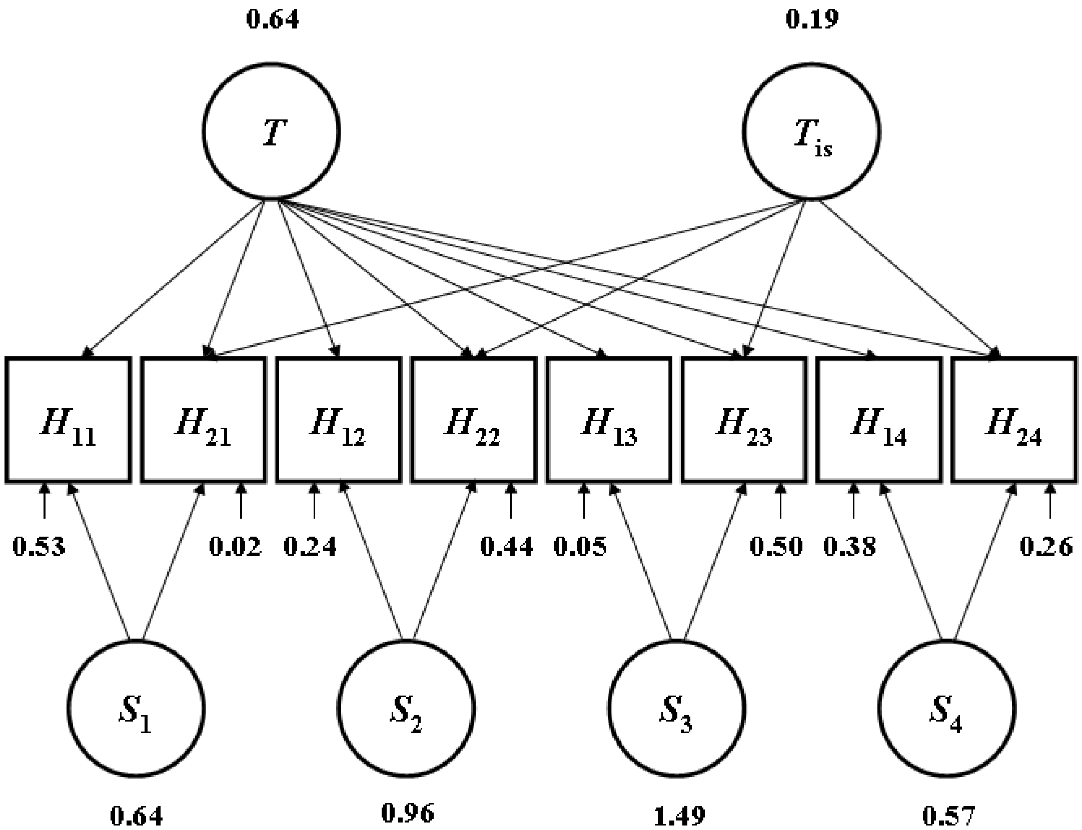

Figure 1. Latent state trait model with variance estimates. H_{ik} = Test halves with i = test half and k = measurement occasion; T = Common trait factor; T_{is} = Indicator-specific trait factor; S = State-specific factor. All loadings have been fixed to 1.

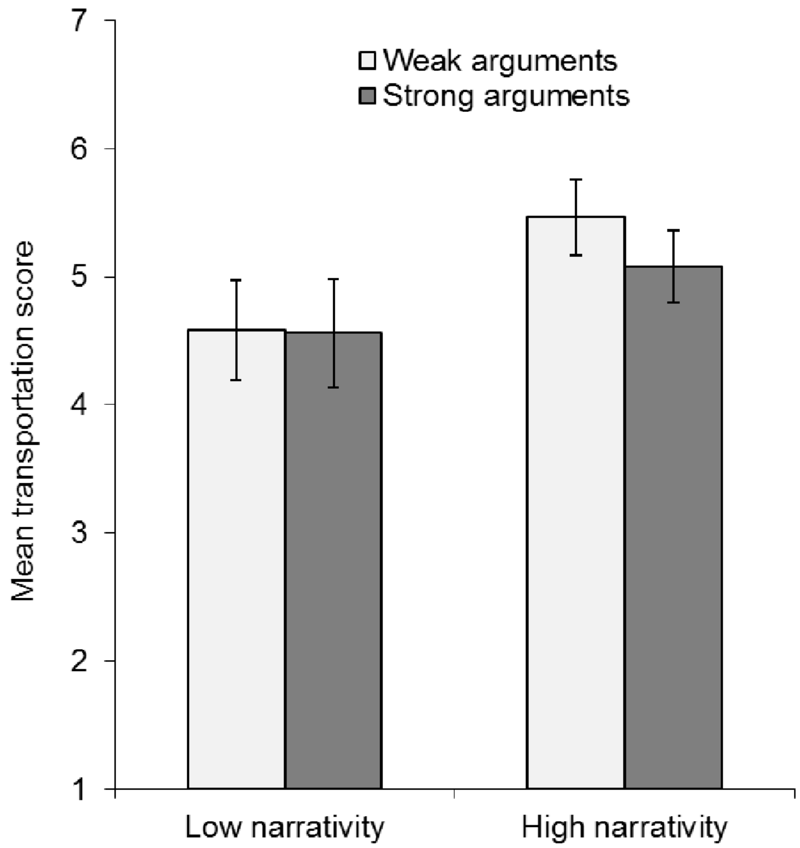

Figure 2. Mean transportation scores (with 95% confidence intervals) by experimental conditions

Online Supplement for

„Experiencing narrative worlds: A latent state-trait analysis“

Transportation Scale – Short Form (Appel, Gnambs, Richter, & Green, 2014)

Item No.	Item
1.	I could picture myself in the scene of the events described in the narrative.
2.	I was mentally involved in the narrative while reading it.
3.	I wanted to learn how the narrative ended.
4.	The narrative affected me emotionally.
5.	While reading the narrative I had a vivid image of *Katie*.
6.	While reading the narrative I had a vivid image of *Joan*.

Note. Items were presented with seven-point response scales from 1 (*not at all*) to 7 (*very much*). Italicized names in items 5 and 6 need to be changed to the names of the main characters of the narrative.