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Perceptual Bandwagon Effects With "Deep" Imaginary Companions

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HIGHLIGHTS

Imaginary friends can represent a connection to an alternate reality that evolves from being a beneficial activity to something more troubling or sinister.

ABSTRACT

Studies of the mediating factors of imaginary companions (ICs) in children and adults are well-represented in the literature. However, the nature and structure of behavioral expressions in IC characters have been less formally scrutinized. We examined these issues in a convenience sample of 389 adults. Of these, 155 self-reported childhood ICs and retrospectively characterized their IC phenomenology via a set of 14 items modified from previous research. Rasch analyses showed that IC experiences form a true probabilistic hierarchy whose structure varied little across respondents' age, gender, having siblings, as well as the respondents' number of past ICs, or their decision to inform others about their IC. This hierarchy starts with *shallow* (i.e., ostensibly 'adaptive or positive') experiences and transition to *deep* (i.e., relatively 'maladaptive or negative') contents at higher levels. Network analysis suggested that respondents invented ICs primarily to combat feelings of loneliness. However, contrary to the Rasch model, when comparing *shallow* vs *deep* IC experients' answers, positive and negative perceptual contents lost their distinction, thereby severely distorting measurement. These distortions were sufficiently powerful to reliably predict respondents' group membership. Results derived from retrospective accounts of childhood experiences, which might differ from IC contents and dynamics measured either in real-time or within adult populations. However, these findings suggest that ICs comprise a latent dimension of shallow-to-deep perceptions that might relate to schizotypal or dissociative phenomena manifesting in everyday contexts.

KEYWORDS

Agency, dissociation, imaginary companions, liminality, Rasch scaling, entity encounter experiences.

INTRODUCTION

'[Entity] encounter experiences' refer to perceived interactions with anomalous beings or sentient forces, including apparitions, angels, gods, demons, poltergeists, extraterrestrials, or folklore–type little people (Evans, 1987; Houran, 2000; Kumar & Pekala, 2001). Their distinctly positive or negative contents often produce strong psychological or transpersonal reactions that influence the belief systems and spirituality of experiencers (see e.g., Laythe, Houran, & Little, 2021). It is important to further note that while the literature in this area mostly references adults, encounter experiences also occur

to children. In fact, recent research has found intriguing links between reports of 'fairies or ghosts' and the well-known phenomenon of children's 'imaginary companions' (ICs) (Drinkwater et al., 2022; Little et al., 2021; Young, 2018), particularly when ICs exhibit 'spooky or independent' actions (Laythe, Houran, & Little, 2021). This suggests, therefore, that some manifestations might be unrecognized varieties of encounter experiences and thus worthy of more detailed study and understanding.

In his *Origin of Consciousness in the Breakdown of the Bicameral Mind*, Julian Jaynes (1976/1990) boldly characterized ICs (or pretend friends) as "true hallucination" (pp. 396-397). Bonne et al. (1999) might concur with this view in referencing these constructions as a "...childhood fantasy, invisible to anyone but the child, who may be named, addressed, or played with" (p. 277). However, Svendsen (1934) arguably provided the most influential operationalization, i.e.,

> an invisible character, named and referred to in conversation with other persons or played with directly for a period of time, at least several months, having an air of reality for the child, but no apparent objective basis. This excludes that type of imaginative play in which an object is personified, or in which the child himself assumes the role of some person in his environment (p. 988).

Researchers generally defer to this early definition, but recent studies indeed support an expanded view that also includes personified objects and pretend identities (Moriguchi & Todo, 2018; Taylor, et al., 2009) given that children with these additional constructions share similar abilities and personality characteristics that distinguish them from children lacking them (Taylor, 1999). For a recent review and discussion of ICs, we refer readers to Armah and Landers-Potts (2021).

It is curious that these complex and nuanced constructions can exhibit both 'positive' and 'negative' elements, which calls into question their ultimate nature or functions. Perhaps this phenomenon is more than mere fantasy play and instead involves a distinct altered or anomalous experience relevant to the issues of mental health, spirituality, and consciousness studies. For example, studies suggest that children with ICs exhibit better *attentional focus* (Mauro, 1991), *social cognition* and *competence* (Davis et al., 2011; Mauro, 1991; Roby & Kidd, 2008; Seiffge-Krenke, 1997; Taylor & Carlson, 1997), *creativity* (Hoff, 2005; Schaefer, 1969; Seiffge-Krenke, 1997), and *language skills* (Bouldin et al., 2002). Manosevitz et al., (1973) also found that children with ICs participated in more *family activities*, whereas Singer and Singer (1990) reported that such children showed more *positive affect* in their play with other children. The high *fantasy-proneness* inherent to IC play (Wilson & Barber, 1983) might further allow children to practice and expand creative thought, thereby promoting intellectual and creative growth (Somers & Yawkey, 1984). This agrees with findings that children with ICs are capable of constructing more *complex narratives* (Trionfi & Reese, 2009) as well as *sharing details* about their IC experiences with interested adults (Gleason, 2004).

However, childhood ICs also correlate with loneliness, trauma, and emotional distress (Taylor et al., 2004) and could be a marker of childhood Schizotypal Personality Disorder (Jones et al., 2015). Elaborated play identities are likewise common in children with dissociative identity disorders (DID) (Taylor et al., 2004), and researchers have thus found a high incidence of ICs in adult individuals with DID (Hornstein & Putnam, 1992; Trujillo et al.,1996). In fact, Pica (1999) proposed that DID advances in three stages that center on ICs. He argued that children predisposed to ICs may develop DID if they experience trauma during a developmental window in early childhood. In the first stage, in which the child experiences trauma, aspects of the traumatic experience are deferred to the IC. At the second stage, an IC takes over for the child during periods of anxiety or threat. By the third stage, ICs standing in during anxious situations transform into distinct personality states called 'alter personalities.'

According to this character progression across stages, distorted perceptual and cognitive contents in ICs (i.e., high vividness, persistent impersonation, and autonomy of ICs; McLewin & Muller, 2006) might parallel, respectively, the derealization, depersonalization, and dissociative identity anomalies that manifest even when healthy (non-clinical) individuals participate in eye- or mirror-gazing tasks (for a review, see Caputo, Lynn, & Houran, 2021). Therefore, we speculate that positive ICs in childhood can take control over the subject's original ego (i.e., the 'core' personality) when trauma produces a detachment of the subject's bodily-self (i.e., depersonalization) and detachment of external reality (i.e., derealization) —thus evolving into pathological DID in adulthood (i.e., multiple personalities). Indeed, research indicates that IC behaviors range from *shallow* (i.e., the IC is basically a copy of the child who created it) to *deep* (i.e., the IC appears to have autonomy, an independent personality, and will) (e.g., Fernyhough et al., 2019; Hoff, 2005; Laythe, Houran, & Little, 2021). Experiences of 'deep' ICs can be profound in a psychospiritual sense and motivate attributions to paranormal agencies or entities (Laythe, et al., 2021).

In the context of paranormal belief and experiences,

Lange et al. (2019) reported distortions due to the emergence of a secondary factor as respondents took more extreme (high) positions. Specifically, this *bandwagon* effect involved strong believers who tended to endorse paranormal belief and experience statements as if they were interchangeable. This resulted in smaller variations in the questionnaire items' endorsement rates. 'Bandwagons' resemble 'halo-effects' in that judgments are distorted to achieve consistency, thereby undermining validity and reliability (Fisicaro & Lance, 1990; Lange, Martinez-Garrido, & Ventura, 2017). Similarly, in a persuasive communication context, Lange and Fishbein (1983) and Fishbein and Lange (1990) observed that inducing disagreement consolidated receivers' conflicting views into a single opinion. *Bandwagons* likewise occur in economic branding (Lange, Oliva, & McDade, 2001) and delusional ideations (Lange & Houran, 2000). We expect that similar effects also play a role in IC character formation. As we explain later, bandwagon effects also raise important measurement issues.

The Present Study

The cumulative literature suggests that IC phenomena comprise a latent dimension ranging from *shallow* to *deep* character formation (cf. Hoff, 2005), and as IC phenomena become *deeper*, they also become increasingly linked to more negative (e.g., schizotypal or dissociative) processes (cf. Pica, 1999). The notion that experiences beyond *shallow* IC phenomena lead to negative outcomes implies that behavioral expressions of ICs form a statistical hierarchy. Also, since *deeper* IC phenomena ostensibly reflect negative/ maladaptive processes — and by implication, *shallow* IC phenomena reflect positive/ adaptive processes — positive contents are expected to precede negative contents. Establishing the hierarchical nature of IC character formation or behavior in this way would have important conceptual and practical implications for the clinical evaluation of ICs in children (see, e.g., Armah & Landers-Potts, 2021; Jones et al., 2015; Taylor, 1999).

We test the above ideas using Rasch (1960/1980) scaling. This method has proved useful in a variety of past investigations of altered or anomalous experiences (e.g., Houran et al., 2019; Lange, Greyson, & Houran, 2004; McCutcheon, et al., 2002) and for an overview of related research we refer readers to Lange (2017). A complete introduction to Rasch scaling is beyond the scope of this paper, and for a detailed overview and discussion, see Bond and Fox (2015). We note that Rasch scaling's main objective is to create a latent dimension along which items as well as persons assume a location at an interval level scale of measurement. Items' and persons' locations are expressed in a common metric called 'Logits.' We are mainly interested here in the items' locations as these reflect the semantics of IC phenomena (e.g., Lange, Irwin, & Houran, 2001). However, if IC items form a true Rasch hierarchy, then it is possible to quantify the 'intensity' (or perceptual depth) of respondents' IC experiences as well.

According to the (binary) Rasch model, if we represent items' *P* and *Q* 'difficulty' by D_P and D_Q, then whenever $D_P < D_Q$ — i.e., item *P* is easier than item *Q* –item *P* has a greater probability of being endorsed than does item *Q*. The model implies that easier items *always* have a greater probability of endorsement than do harder items, regardless of persons' locations along the latent dimension.

Thus, in a probabilistic sense, the item hierarchy (i.e., the order of items' relative likelihood of endorsement) is the same for all individuals, at least within the bounds of statistical estimation error. This implies that the item hierarchy should be *invariant* across subgroups of respondents (e.g., men vs women). Finding a stable item hierarchy is not guaranteed, and statistical tests can determine whether items' hierarchies differ significantly across subgroups of respondents. In practice, DIF > 0.25 is deemed noteworthy, and differences > 0.5 are deemed to matter materially, especially when statistically significant. Based on the preceding, we tested five hypotheses:

1. IC experiences form a probabilistic Rasch hierarchy as defined above, and we will use Network analysis to support our interpretation of this hierarchy.
2. The hierarchy of IC experiences is such that *shallow* perceptual contents precede *deep* perceptual contents, i.e., on average, $D_{shallow} < D_{deep}$. *Shallow* experiences tend to be pleasant and constructive, whereas *deep* experiences tend to be negative and maladaptive. This hypothesis follows previous speculations (e.g., Hoff, 2005; Pica, 1999) but adds the requirement that the relationship between *shallow* and *deep* IC experiences is probabilistic.
3. The hierarchy of IC experiences does not vary significantly across external factors, including respondents' age, gender, having siblings, respondents' number of past ICs, or their decision to inform others about their ICs.

The following hypotheses also concern the IC hierarchy, but they are treated separately as they contradict the item hierarchy invariance implied by Hypothesis 3:

4. The negative and unpleasant nature of *deep* perceptual contents has the *bandwagon* effect of casting all other perceptual contents in a negative light as well. Accordingly, for respondents who endorse *deep* ICs,

the item location estimates *D* will show *less* variation than do the locations as estimated using non-extreme (*shallow*) respondents.

5. Hypothesis 4 implies that *shallow* IC experients have different Rasch model residuals than do experients reporting *deep* ICs. This hypothesis is tested based on the accuracy of the prediction of respondents' group membership in the *shallow* vs *deep* IC groups using Logistic regression.

Since Hypotheses 4 and 5 imply that items' locations actually *do* vary with an external factor (i.e., *shallow* vs *deep* respondents) they contradict the assumptions of Rasch scaling and also Hypothesis 3. Basically, their validity implies that the estimation of respondents' trait levels will be selectively distorted. It is, therefore, instructive to gauge the impact of such item shifts.

METHOD

Respondents

Data were derived from a convenience sample of 389 volunteer respondents (M_{age} = 40.41, *Md* = 40.0, *SD* = 14.05, range = 18-83 yrs.) recruited via Internet-mediated research. The link to the study was shared by universities in the UK, USA, and Australia, who disseminated the information to potentially interested parties. Participants answered advertisements for participation via a weblink and encouraged others to complete the survey in a snowball sampling approach. Our sample specifically comprised individuals identifying as male (*n* = 99, 25.4%, M_{age} = 44.47, *Md* = 46.0, *SD* = 14.46, Range = 18-75 yrs), female (*n* = 277, 71.2%, M_{age} = 39.18, *Md* = 39.0, *SD* = 13.71, Range = 18-83 yrs), and non-binary (*n* =13, 3.3%, M_{age} = 35.61, *Md* = 37.0, *SD* = 12.64, Range = 22-64 yrs).

Measures

Imaginary Companions. The items used here are based on a literature search of existing IC instruments, including Hoff (2005), Majors and Baines (2017), and Silberg (2012). As is shown along the rows of Table 1, this yielded 14 "Yes/No" statements that asked respondents about different behavioral expressions of their ICs (see Figure 1). Of these, items 1, 2, 9, 11, 13, 14, and 15 were *a priori* classified as *shallow*, and items 3, 4, 5, 6, 7, 8, and 10 were classified as *deep*.

To determine whether respondents actually had an IC during childhood, they were shown Taylor, Cartwright, and Carlson's (1993) definition (*"Pretend friends are ones that are make-believe, that you pretend are real"*), followed by Auton, Pope, and Seeger's (2003) screening question *"Did you ever have an imaginary friend growing up?"* If respondents answered "No," they skipped the remainder of this study. Those responding "yes" were asked to indicate the number of imaginary companions they had. Those reporting multiple companions, were told to focus in the remainder on their most "significant" imaginary friend (cf. Silberg, 2012). Of the 389 respondents, a subset of 155 (40%) reported having an imaginary friend when growing up, and only the data of this subset was analyzed in the following.

Procedure

This research was part of a broader study on the perceptual-personality profiles of IC experients (cf. Drinkwater et al., 2022). The Participant Information Sheet (PIS) was accessed via a web link hosted by the Qualtrics survey administration tool. The PIS presented a brief outline of the study and an overview of ethical procedures. If respondents consented to participate, they then progressed to the study measures. These requested that respondents attempt all items, work through sections at their own pace, reply honestly, and carefully read all instructions and questions. The materials comprised sections on demographics (i.e., age and preferred gender), imaginary companions, and various cognitive-perceptual measures not considered here.

Respondents were debriefed on completion of the survey. We employed procedural strategies to reduce potential method effects. To negate order effects, the sequence of both sections and scales rotated across respondents. Since the study used a cross-sectional design, where data collection occurred at one point in time, the study directions emphasized that each question set was unique and different. This technique has been successfully used in other work to counter 'common method variance' (CMV) (Spector, 2019). CMV is always a concern when respondents answer different scale items in the same testing session because proximity can inflate perceived relationships between different constructs (Podsakoff et al., 2003). Finally, to lessen the possible influence of social desirability, the study brief emphasized responses should reflect individual opinions and perceptions, since there were no correct responses.

Rasch Modeling

We used Linacre's (2021) *Winsteps*® software to Rasch scale the data via the Conditional Maximum Likelihood Estimation approach. In addition to estimating items' and persons' locations and their respective standard errors of estimate (*SE*), *Winsteps* also computes items' and persons' Outfit. Both types of fit reflect the average

Table 1. Summary of Rasch Scaling Analyses

						Item Shift (Logits)				
	Location	SE	Outfit	z-Outfit	Gender	Age	No. of friends	Have Siblings	Told Others	Shallow –Deep
Shallow Items										
11:My imaginary friend played with me when I was lonely.	-3.05	0.28	1.64	1.40	1.44	0.13	-0.50	0.07	0.00	**2.51**
15:My imaginary friend came to me when I was happy.	-2.62	0.25	1.29	0.86	0.84	0.53	-0.05	-0.24	-0.08	**2.34**
13: My imaginary friend helped me when I was afraid.	-2.00	0.22	1.02	0.16	1.03	0.36	0.70	-0.06	0.11	*1.17*
9:My imaginary friend had skills or abilities that I did not have.	-1.39	0.20	1.02	0.16	-0.30	0.17	0.31	0.50	0.61	0.07
1:My imaginary friend was more than just a make-believe friend.	-0.92	0.19	**1.70**	**3.29**	-0.25	-0.72	-0.17	-0.22	0.51	0.95
2:My imaginary friend gave good advice.	-0.78	0.19	0.95	-0.22	-0.15	-0.56	0.21	0.00	0.30	0.76
14:My imaginary friend came to me when I was angry.	-0.39	0.19	1.35	1.90	0.68	0.60	-0.81	0.23	-0.84	0.66
Deep items										
8: My imaginary friend had knowledge about my life that did not have.	0.56	0.21	0.96	-0.07	-0.63	-0.61	0.00	-0.16	-0.03	*-1.07*
10:My imaginary friend did not like others to know about him/her.	0.99	0.23	0.77	-0.72	-1.25	-0.91	-0.45	-0.15	**-1.20**	-0.88
6:My imaginary friend told me to keep secrets.	1.13	0.23	0.51	-1.71	-0.64	0.24	0.25	-0.35	0.51	**-2.41**
7:My imaginary friend tried to boss me around.	1.65	0.27	1.08	0.32	0.00	0.51	-0.08	-0.24	0.42	*-1.99*
3:I had more than one imaginary friend and they disagreed.	1.86	0.28	0.71	-0.53	1.27	1.18	**2.76**	0.73	0.11	-1.10
4:My imaginary friend annoyed me and I wished it would go away.	2.10	0.30	1.14	0.43	-0.11	0.36	-1.08	0.44	-0.26	*-2.11*
5:My imaginary friend took over and made me do things I did not want to do.	2.87	0.40	1.86	1.26	-1.41	-0.09	-0.98	-0.57	-0.45	-1.00

Gender: Positive = over endorsed by women, Negative = over-endorsed by men

Age: Positive = over-endorsed by younger respondents, Negative = over-endorsed by women

No. of Friends: Positive = over-endorsed by those with > 1 IC, Negative = over-endorsed by those with just 1 IC

Have Siblings: Positive = over-endorsed by those with siblings, Negative = over-endorsed by those without siblings

Told Others: Positive = over-endorsed when told others about IC, Negative = over-endorsed when other were not told

Shallow vs Deep: Positive = over endorsed by those selecting 2 or more deep items, Negative = over endorsed by those who selected 1 or fewer deep items

mean-squared difference between the predicted actual scores across items and persons, respectively (Lange et al., 2017)." Under perfect model fit, Outfit statistics have the value 1, whereas larger values are indicative of 'noisy' response patterns. Naturally, Outfit values are subject to random variation, and Outfit excursions beyond 1.4 are considered problematic (Linacre, 2021), especially when statistically significant. *Winsteps* can also evaluate the invariance of the item hierarchy with statistical tests for pairwise comparison of items' locations *D* across subgroups. Here, we created subgroup pairs based on respondents' Gender and Age ("up to/over 40 years"), having siblings ("no/yes"), number of past ICs, and respondents' decision to inform others about their IC ("no/yes"). As well, we will consider shallow vs. deep related item shifts, where 'deep' persons are those endorsing two or more deep items and shallow persons are defined as the converse.

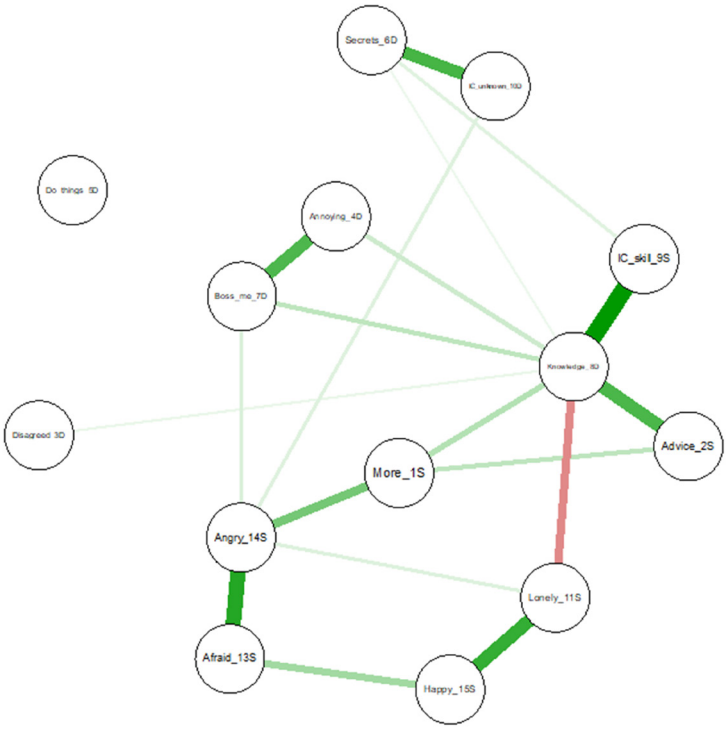

Figure 1. Network Structure of the 14 IC Questionnaire Items.

Networks of Items

To aid in the interpretation of the IC item hierarchy, we use 'network modeling' (see, e.g., Epskamp et al., 2017; van Borculo et al., 2014) that has proved useful in studies of attitudes, intelligence, and psychopathology. A computationally efficient model for estimating the graph structure of binary items is described by van Borculo and Epskamp (2016) and is implemented in their R-based *IsingFit* software. *IsingFit* yields an undirected graph whose vertices reflect the strength of the relations between a set of items, as represented by its nodes. Although the strength of the relations may vary, no causality should be inferred. Our hypotheses imply that *shallow* IC items should be more connected than *deep* IC items. However, clustering is mainly used for descriptive purposes, and no other predictions are offered.

RESULTS

Hypothesis 1

Table 1 summarizes the basic scaling properties of the fourteen IC items. The Outfit column of this table shows that all but three items showed acceptable fit to the Rasch model (i.e., *Outfit* < 1.4). Of these, only the Outfit value of Item 1, "*My imaginary friend was more than just a make-believe friend*" significantly deviates from 1 (Outfit = 1.70, z = 3.29, $p < 0.001$) – i.e., this item was 'noisier' than would be expected based on the Rasch model. We suspect that Item 1 was deemed ambiguous, because one possible reading suggests that the IC is a real friend, while another suggests that the IC relationship is possibly non-platonic. With these caveats, the data support Hypothesis 1, i.e., the fourteen IC items' fit to the Rasch model is sufficient to contend that they form a probabilistic hierarchy. However, recall that Hypotheses 4 and 5 must also be considered.

Hypothesis 2

Table 1 lists the IC items in order of increasing endorsement difficulty, as expressed by the items' Logit values listed in the 'Location' column – i.e., the items near the top were endorsed more often than those near the bottom. This ordering defines the semantics of the latent IC character formation dimension. That is, the *shallow* items at the lowest difficulty levels concern positive (adaptive) issues such as "playing" with the IC when lonely, supporting and "helping," followed by the IC having "skills or abilities," giving "good advice," and having a soothing role when the person is angry. By contrast, the

deep items with higher difficulty levels increasingly refer to negative (maladaptive) topics, ranging from the IC wanting privacy and desiring to keep secrets, to "bossing around" the experient, disagreement among multiple ICs, being annoying, and taking over the experients' lives.

Thus, in support of Hypothesis 2, the hierarchy starts with friendly, supportive behaviors by the IC characters, but these actions progress to unfriendly and manipulative actions that cast the ICs in a bad light. As the items form a true hierarchy (Hypothesis 1), it follows that *deep* (negative, maladaptive) experiences likely are accompanied by *shallow* (positive, adaptive) experiences. By contrast, *shallow* experiences occur mostly in isolation. Hypothesis 2 was addressed via a *t-test* over the Logit magnitudes of the *shallow* items' (top of Table 1) vs the *deep* items (bottom of Table 1). The means of the *shallow* and *deep* item groups are -1.59 and 1.59 Logits, respectively, and this difference is statistically significant ($t(12) = -6.68$, $SE_{dif} = 0.48$, $p < .001$).

Ancillary Analyses. Figure 1 shows the estimated network structure of the 14 IC items. Short item descriptions are suffixed by their number in Table 1, as well as a type-indicator —*deep* IC items finish with the letter 'D' and the *shallow* IC items with 'S.' As predicted, *deep* IC items are intra-connected by far fewer links than *shallow* IC items, a topic to which we return in later sections. Here, we focus on the pattern of the items' relations, as reflected by the girth of the graph's vertices: positive relations are shown in black, negative relations are shown as boxes only, and thin lines reflect weak relationships.

As is indicated by the girth of the vertices, IC items dealing with similar contents tend to be highly related:

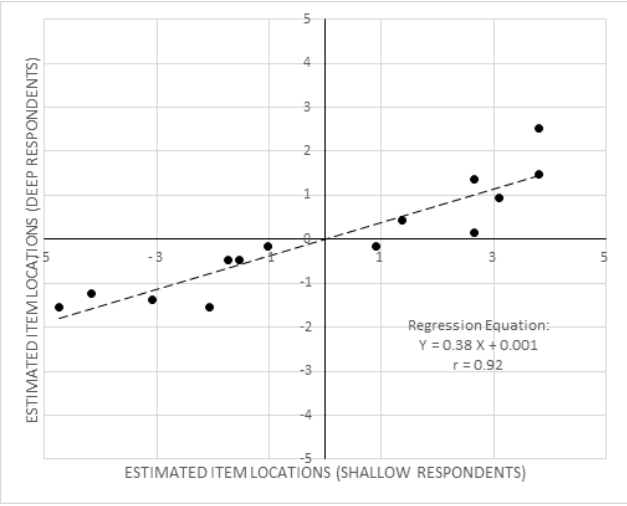

Figure 2. Items Location Estimates using Shallow vs Deep IC Respondents.

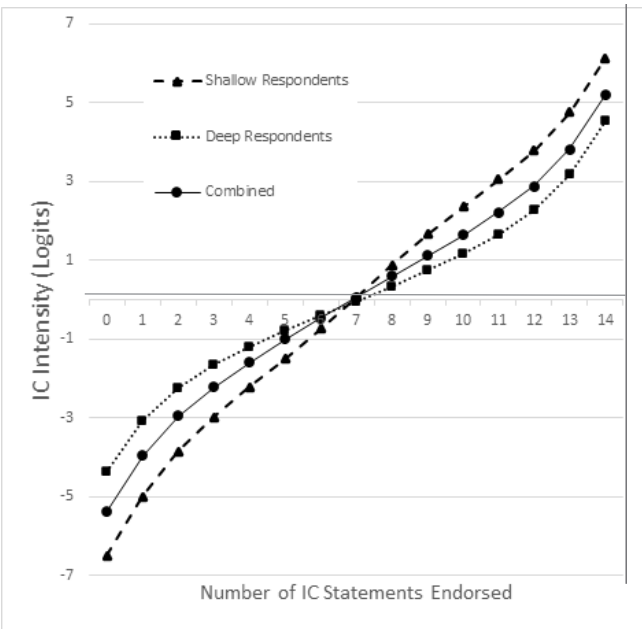

Figure 3. Raw Score to Rasch Logit Transformation Based on Three Respondent Groups.

"keeping secrets" (Item 6) and the "IC being unknown" (Item 10), "IC helps when experient is angry" (Item 4) and "IC helping when experient is afraid" (Item 7), etc. All but one of these vertices are black, indicating that these IC experiences tend to co-occur. The exception is the relation between Items 11 ("My imaginary friend played with me when I was lonely") and 8 ("My imaginary friend had knowledge about my life that I did not have"), which show a negative relation. Thus, *not* being lonely and being understood by the IC are positively related. Since Item 8 is the 'central node' in the graph, we conclude that an IC's most important role is to support an experient during periods of loneliness.

Hypothesis 3

Statistical tests were performed to determine whether the IC item hierarchy varied across respondents' gender, age, number of claimed imaginary friends, presence of siblings, and their decision to tell others about the ICs. The column entries under 'Item Shifts' in Table 1 show the group differences in Logits between the pairs of subgroups, and the footnote to this table indicates how the five variables were re-coded to obtain just two categories. As is indicated by the boldface entries, just one of the 70 (i.e., 14 x 5) pairwise comparisons reached statistical significance ($p < .01$). Such a finding is to be expected since the probability of obtaining one or more significant effects among 70 "trials" with $P_{success} = 0.01$ is quite high ($p > 0.15$, determined via the binomial distribution and assuming independence). Thus, in support of Hypothesis

3, there is little evidence that the IC item hierarchy varies materially across the five subgroup variables.

Hypothesis 4

Testing Hypothesis 4 involves a comparison of item location as estimated for *deep* respondents who endorsed *two or more deep IC items* vs. *shallow* respondents who endorsed *fewer than two deep items*. The entries of the right-most column of Table 1 reveal that 9 of the 14 items show large location differences (greater than 1 Logit) between the *deep* and *shallow* respondent groups. The boldface entries in the right-most column of Table 1 indicates that three of these differences reached statistical significance at $p < .01$. Also, entries in cursive type indicate that the group difference across another six items is marginally significant ($p < .05$).

Figure 2 plots the item locations obtained for *shallow* respondents along the X-axis, whereas items' locations for *deep* respondents are plotted along Y. Table 1 likely obscured the fact that items' locations for *shallow* and *deep* IC respondents are, in fact, highly correlated ($r = 0.91$, $p < 0.001$) as items' hover around a straight line. However, indicative of the hypothesized *bandwagon* effect for *deep* IC respondents, the slope of the regression line (0.38) is far below unity, which indicates that the items' locations of *deep* IC respondents vary less ($SD_{deep} = 1.24$) than do the location estimates obtained for *shallow* IC respondents ($SD_{shallow} = 2.98$). Squaring these *SD*s and dividing yields $F(13,13) = 5.73$ —i.e., the variance of the item locations for *shallow* IC respondents is over five times larger than that for *deep* IC respondents. In support of Hypothesis 4, this effect is statistically significant ($p < 0.01$); thus, *deep* IC respondents indeed tended to regard the items as more similar to each other than did the *shallow* IC respondents.

This bandwagon effect has dramatic consequences on the estimates of respondents' IC intensity levels. Figure 3 shows three translation of respondents' raw sum (i.e., the number of endorsed statements, *X-axis*) into their estimated location along the latent Rasch dimension in Logits (*Y-axis*), and these translations differ according to whether *shallow* IC respondents, the *deep* IC respondents, or their *combined* data were used. In particular, the Logit range for the *shallow* IC respondents (-6.49 to 6.13 = 12.62 Logits) is far greater than that obtained for the *deep* IC respondents (-4.37 to 4.54 = 8.91 Logits), whereas the range for the combined is intermediate. We further note that the *shallow* curve (triangular markers) and *deep* curve (square markers) for 11 of the 15 possible raw score values differ by more than their standard error of measurement (*SE*).

Also, as is shown on the right side of Figure 3, consider respondents with a raw sum of 12. If the *combined* sample estimation is used, then the estimated IC intensity is 2.87 Logits. However, for a raw sum of 12, the estimates according to the *deep* and *shallow* calibrations vary from 2.27 to 3.78 Logits, respectively, both with an *SE* of around 0.9 Logits. Conversely, an estimated IC intensity of about 3 Logits is obtained for raw sums of 11, 12, and 13 for the *shallow*, *combined*, and *deep* calibrations, respectively. Because *(a)* the *same* raw sum produces different estimates, and *(b)* nearly identical trait estimates are obtained for different raw sums, estimation has become inconsistent.

Table 2. Accuracy of Group Membership Prediction in Validation Sample

		Predicted		
		Shallow	**Deep**	**Total**
Actual	**Shallow**	20	3	23
	Deep	2	6	8
	Total	22	9	31

Hypothesis 5

Using Pedregosa et al.'s (2011) Python-based *Scikit-learn* software, we randomly and independently divided respondents into Training ($n = 124$) and Validation ($n = 31$) samples. Next, using only their 14 response residuals, we used Logistic Regression to predict respondents' membership of the *Shallow* vs *Deep* IC groups for the Training set only. Although we found no clear interpretation of the regression model, when applied to the Validation set, this model reached 84% accuracy (see Table 2). This exceeds the baseline predictive accuracy of 74% by 12%, and this effect is statistically significant ($\chi^2(1) = 8.26$, $p < .01$). Thus, consistent with Hypothesis 5, the *Shallow* vs *Deep* hierarchy shifts proved to be sufficiently strong to produce different response misfit patterns in the two respondent groups. These findings also suggest that items' borderline acceptable fit (see Table 1) might partly be due to the distortions introduced by the item hierarchy differences obtained in the *Shallow* vs *Deep* IC respondent groups.

Ancillary Analyses. The success of Hypotheses 4 and 5 calls into question the distinction between *shallow* and *deep* IC items, as predicted by Hypothesis 2. We, therefore, sought to establish the hierarchical relation between *shallow* and *deep* items without any reliance on the Rasch model. To this end, we computed raw endorsement sums separately for the *shallow* and *deep* IC item subsets, thus obtaining for each person a pair (R, C) = (*# shallow items endorsed, # deep items endorsed*). Aggregating the (R, C) across all respondents yielded Table 3. It can be seen there that cells with R > C (below the diagonal)

Table 3. Cross-table of *Shallow* ICs Raw Sum x *Deep* ICs Raw Sum Frequencies (see text).

		Raw sum for the seven deep items								
		0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Total**
	0	0	0	0	0	0	0	0	0	0
	1	6	0	0	1	0	0	0	0	7
	2	10	1	1	0	0	0	0	0	12
Raw sum for the seven	**3**	12	5	2	1	0	0	0	0	20
shallow items	**4**	15	5	5	1	1	0	0	0	27
	5	15	5	8	1	1	1	0	0	31
	6	13	8	7	2	1	1	0	2	34
	7	3	8	4	5	2	1	0	1	24
	Total	74	32	27	11	5	3	0	3	155

tend to occur with greater frequency than those with R < C (above the diagonal), i.e., the endorsement of *shallow* items indeed consistently precedes those of the *deep* items. This relation holds in all but one case [i.e., #(6,7) > #(7,6)].

To obtain a statistical test, we compared the summed frequencies below the diagonal vs the sum of the diagonal + above diagonal entries against the Null Hypothesis of equality. In support of Hypothesis 2, this test easily reached statistical significance ($\chi^2(1) = 168.57$, $p < .001$). Thus, not only are *shallow* ICs indeed endorsed more often, but the *shallow* vs *deep* IC endorsement pattern has the hypothesized hierarchical properties.

CONCLUSIONS AND LIMITATIONS

This research showed that *shallow* (i.e., 'benign and controllable') and *deep* ('negative and with seemingly autonomous agency') ICs are not two separate classes of altered experiences. Rather, they form a reasonably robust hierarchy with shallow IC characters and behaviors reliably preceding their deeper and more troubling forms. In fact, there is statistical evidence that percipients of deep ICs show bandwagon effects that preclude any distinctions between shallow and deep IC experiences. This structured evolution of perceptual contents could indicate psychopathological risks in the maturation of a child's character or personality. Our findings are thus not merely theoretical but have important clinical value. Moreover, we speculate that children experiencing deep ICs (especially due to loneliness) often rely on religio-cultural cues or other social influences to contextualize their perceptions as encounters with paranormal entities like "ghosts or fairies" (cf. Laythe, Houran, & Little, 2021; Little et al., 2021; Young, 2018).

However, our study has several important limitations. Most notably, the results should be replicated using larger and more diverse samples to ensure the consistency and stability of our IC model. We also note that while network models provide useful information, this statistical information does not have inferential validity, so interpretations are confined to the description of nodes and interrelationships between variables. Another possible limitation concerns the items of the questionnaire. The current items might be extended to better cover the different facets of dissociation and dissociative states. Particularly, *derealization* (i.e., detachment of external reality from mental representations) and *depersonalization* (i.e., detachment of internal bodily feeling from mental representations). Future versions of the questionnaire, therefore, could be more precise in the clinical diagnosis based on ICs, for example, in the prognosis of schizotypy vs. schizophrenia vs. DID. Relatedly, we did not directly measure schizotypal-dissociative tendencies in our respondents. It will thus be important for new research to explicitly link our IC model to increases in these tendencies. We are nonetheless encouraged by independent studies that have started to establish such connections (e.g., Drinkwater et al., 2022; Zarei et al., 2022).

GENERAL DISCUSSION

Notwithstanding potential confounds with retrospective studies (e.g., Ayhan & Işiksal, 2004; Talari & Goyal, 2020; Van Der Vaart et al., 1995), the empirical findings here consistently supported our theory-driven hypotheses. *First*, Rasch scaling and non-parametric methods alike showed that IC perceptions form a true (probabilistic) hierarchy. *Second*, the endorsement hierarchy of IC experiences varied little across respondents' age, gen-

der, having siblings, as well as the respondents' number of past ICs or their decision to inform others about their IC. *Third*, the IC experience hierarchy starts with *shallow* (ostensibly adaptive) perceptions that appear to be under the control of the experients, which transition into *deep* perceptions at higher levels of IC intensity while becoming progressively negative (ostensibly maladaptive) in the contents and involving ICs with autonomous wills and actions. This agrees with previous speculations on IC character formation (Hoff, 2005; Pica, 1999), although it adds the observation that IC experiences form a hierarchy such that 'negative/deep' forms were nearly always preceded by 'positive/shallow' forms —but not vice versa. Further, the network analyses indicated that, loosely speaking, respondents ostensibly invented ICs to combat their loneliness.

However, the preceding picture is marred by the finding of significant Rasch hierarchy shifts in respondents reporting two or more deep beliefs, as is entailed by the remaining two hypotheses. Consistent with the notion that *deep* ICs comprise perceptions that involve cognitive bandwagon effects, we found that the distinction between positive and negative experiences (largely) disappears for those endorsing *deep* IC items (Hypothesis 4). The resulting measurement distortions are sufficiently powerful to successfully identify shallow vs deep IC experients (Hypothesis 5). Together, this caused inconsistencies in the estimation of respondents' IC intensity that cannot be corrected using more complex Item Response models (e.g., Carlson, 2021) or non-parametric scaling approaches (e.g., Molenaar, 2002). Although this was not further pursued, the use of 'Saltus' type models, as pioneered by Wilson (1989), appears an appropriate option here.

Affirming Hypotheses 1, 2, and 3 implies that IC experiences are basically innocuous, with more intense or negative IC experiences being no more than "too much of a good thing." However, the support for Hypotheses 4 and 5 suggests that deep ICs induce marked perceptual distortions. Thus far, we have described these distortions in terms of deep vs shallow ICs, cognitive bandwagon effects, and measurement inconsistencies — and, at least for our sample, it seems likely that ICs did not reflect explicit psychopathology. Nonetheless, the entire range of IC experiences might still involve dissociation-schizotypal type processes (cf. Drinkwater et al., 2022; Giesbrecht et al., 2007; Zarei et al., 2022). For instance, future studies might discover that the research and theory on mirror-gazing provides a suitable framework to describe and understand the hierarchy of IC character formation (for reviews, see Caputo, 2019; Caputo et al., 2021; Lange et al., 2022; Martiniz-Conde & Macknik, 2019).

Particularly, perceptual distortions predictably occur even when healthy (non-clinical) subjects stare intently into a mirror or into another individual's face for about ten minutes under conditions of low illumination. The reported experiences include (a) *derealization* (i.e., changes in sensory maps of external world processing; hence, visual deformations in perceptions, such as distorted facial features, animal faces, and cartoon-like faces); (b) *depersonalization* (i.e., changes of multisensory integration on bodily-self; hence, out-of-body experiences, and 'sensed presences,' which may eventually be embodied beyond or behind a specular image); and (c) *dissociative identity* (i.e., changes with self-concept, thus 'projections' of strange personalities in place of the subject's real face reflected in the mirror, experiences of double or multiple personalities, and idealized characters such as visions of a child or an adolescent).

Although more research is needed to disentangle these three dissociative phenomena potentially influencing the phenomenology of ICs, we propose that the 14 IC items represent measures of the different facets of *dissociative-identity*. For example, the 'shallow-to-deep' dichotomy could reflect the increase of *depersonalization* in the deep items. In fact, when ICs show independent autonomy, aka 'agency' (e.g., Item 8, "My imaginary friend had knowledge about my life that I did not have"), this could be the proof that a depersonalization occurred and that the IC takes over the experient's agency, which is the high-level component of the minimal-self (Gallagher, 2000). Similarly, the other component of minimal-self — which is body-ownership and 'sense of presence' — might be involved even at other stages of IC deepening (e.g., Item 10: "My imaginary friend did not like others to know about him/her" or Item 6: "My imaginary friend told me to keep secrets"). In fact, when "secrets" are required from the IC experient, this possibly presupposes that ICs have obtained body-ownership and consequently a 'sense of presence' that the experient does not grasp for him/herself and, thus, the autonomous IC can direct the experient.

This line of thinking offers several testable hypotheses. For example, we expect that structural equation modeling will find that reported IC experiences intensify in accordance with scores on measures of schizotypy or dissociation, and that IC contents parallel the progression of perceptions reported during eye or mirror-gazing protocols, i.e., the chain of 'derealization → depersonalization → dissociative identity' (Lange et al., 2022). Of course, future studies would need to measure the perceptual contents of IC experiences more comprehensively by adding items that more distinctly reference putative derealization, depersonalization, and dissociative identity.

This approach can also permit refinements in new questionnaire statements that aim to explore whether ICs can comprise 'negative/shallow' and 'positive/deep' forms, which would run counter to the modeling and findings reported here. We are actively exploring these issues and will prepare follow-up reports in due course.

IMPLICATIONS AND APPLICATIONS

The study and understanding of deep ICs are not limited to isolated lines of research or theory. The contents of these experiences suggest application to many areas, including transpersonal psychology, parapsychology, altered states of consciousness, and even spirituality, when people's interpretations of deep ICs involve supernatural agents with seemingly benevolent or sinister motives. In fact, ICs could offer a greenfield of research opportunities that advance our understanding of encounter experiences that seem outwardly different but share similar perceptual contents and narrative structures. Thus, we fully expect that the IC model discussed here can inform these other related phenomena—especially in contexts where the ostensibly 'anomalous beings or sentient forces' show ostensibly independent agency, involve distressing perceptual contents, or persist over time (see, e.g., Laythe et al., 2021).

The study of ICs likewise has practical implications for assessment in clinical practice (Armah & Landers-Potts, 2021; Taylor, 1999). A case in point is the Melbourne Assessment of Schizotypy in Kids (MASK), which contains two items about childhood ICs that purportedly reflect 'positive' schizotypal symptoms (Jones et al., 2015, Table 3), i.e.: (a) "Refers to imaginary characters, creatures, or events" and (b) "Imaginary characters, creatures, or events appear important to the child, more so than actual friends or events." With regards to (a), we note that simply referring to imaginary agents is probably useless for clinical diagnostics. Statement (b) is more appropriate as it points to experiences beyond superficial or transactional behaviors.

Recall, however, that our network model identified Item 8 (i.e., "My imaginary friend had knowledge about my life that I did not have") as the most central node, and we suggest adding items related to this topic as neither (a) nor (b) touch this crucial issue that hints at autonomy in IC agency that perhaps suggests an anomalous, altered, or pathological experience. Thus, this theme might delineate the point at which ICs with adaptive or positive contents are at risk for (if not already evolving to) more maladaptive forms. Treatment considerations are relevant since the need to diagnose prodromal dissociative disturbances and DID early in its course of development, before trauma, might initiate detachment of bodily-self and detachment of external reality, thus before compartmentalization of an alter personality begun fighting for the subject's control.

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