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Folk Beliefs about Phenomenological Differences and Similarities Between Kinds of Mental States

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Abstract

The topic of this chapter is pre-theoretical *beliefs* about phenomenological similarities and differences between mental states. I report the results of a set of exploratory studies on folk beliefs about phenomenological differences and similarities between dreaming, remembering, perceiving, imagining, and hallucinating. Study participants were inclined to treat some pairs of mental states as phenomenologically relatively similar (dreaming and imagining; hallucinating and dreaming) and other pairs as phenomenologically relatively different (hallucinating and remembering; dreaming and seeing). Similarity judgments, however, were often sensitive to the order of comparison. For instance, study participants were much more inclined to agree that hallucinating feels like seeing than that seeing feels like hallucinating, and much more inclined to agree that dreaming feels like seeing than the other way around. Furthermore, beliefs about phenomenological similarity were associated with beliefs about how likely various metacognitive mistakes are.

The topic of this chapter is pre-theoretical *beliefs* about phenomenological similarities and differences between mental states. To the best of my knowledge, this issue has not been subject to empirical investigation before.[1] I report the results of a set of studies on folk beliefs about phenomenological differences and similarities between dreaming, remembering, perceiving, imagining, and hallucinating. On the one hand, I investigate folk beliefs about how similar are experiences of being in one kind of mental state to those of being in another kind of mental state. On the other, I investigate folk beliefs about how likely it is to mistake being in one kind of mental state for being in another kind of mental state.

This is also an attempt to develop ways to study folk beliefs about phenomenological differences and similarities between mental states. My studies are exploratory, and while I started this research with no specific expectations, several patterns that are relatively stable across the studies have emerged.

[1] But see Study 12 in Sant'Anna and Dranseika (2024) for an early attempt. There is, however, considerable theoretical literature addressing phenomenological similarities and differences between various mental states (rather than *beliefs* about such similarities and differences). See, for example, Teroni 2017, Rosen and Barkasi 2021, Windt 2015. See also a recent empirical study suggesting that differences in people's *general beliefs* about phenomenal experience can be caused by differences in their phenomenal experience (Lupyan et al. 2023).

Study 1. Triples

In my first attempt to study folk beliefs about phenomenological differences and similarities between kinds of mental states, I gave participants triples of mental states and asked them to indicate which mental state feels the most dissimilar to the other two.

Participants. All studies reported in this paper were online studies with paid study participants recruited on *Prolific.co*. All participants were US or UK nationals who indicated English as their first language. Sample characteristics for individual studies are presented in Table 1.[2]

Study	*N*	M_{age} (*SD*); age range	% woman / man / non-binary / NA
Study 1. Triples	80	35.4 (13.2); 18-68	68% / 29% / 3% / 1%
Study 2. Conjoined pairs	69	41.6 (14.7); 20-83	49% / 48% / 3% / 0%
Study 3. Ordered pairs. Specific	100	35.1 (12.4); 18-64	55% / 43% / 2% / 0%
Study 4. Ordered pairs. General	97	37.9 (14.2); 19-72	50% / 49% / 2% / 0%
Study 5a. Reality and externality	50	44.5 (13.4); 20-77	52% / 48% / 0% / 0%
Study 5b. Action and control	50	44.2 (15.4); 21-79	44% / 52% / 4% / 0%
Study 5c. Vividness and detail	50	40.7 (16.2); 20-77	48% / 50% / 2% / 0%
Study 6. Mistakes	60	41.7 (13.3); 20-75	50% / 48% / 2% / 0%
Study 7. Metacognitive transparency	50	38.9 (14.4); 19-69	50% / 46% / 2% / 2%
Study 8. Justifications	42	35.0 (15.1); 18-78	50% / 50% / 0% / 0%

Table 1. Sample characteristics for studies reported in this chapter. Percentages may not add up to 100% due to rounding.

Materials. Study participants read the following introduction to the task:

> This study is about what one *experiences* while having various mental states, about *what it feels like* to have various mental states.
>
> You will be provided with sets of three mental states and asked to indicate which of the three *feels most dissimilar* to the other two.

Then each participant received every possible triple composed of the following five mental states – hallucinating, dreaming, seeing, imagining, remembering. Mental states within a triple were presented in randomized order. With five mental states, ten different triples can be constructed. For each of the triples, participants were asked: 'Which of the following three mental states *feels* most dissimilar to the other two?' Half of the participants received mental states in general (i.e., 'Hallucinating; Dreaming; Seeing') while another half of the participants received mental states with specific content (namely, a tiger, i.e., 'Hallucinating a tiger; Dreaming a tiger; Seeing a tiger').

Results. No differences between the two types of the task (general *vs* specific content) were detected (Chi-squared tests, all *p*s > .06), so participants were pooled for further analysis. Study results for each triple are presented in Figure 1a. Percentages indicate how frequently a given pair 'won'. For example, in a triple of dreaming, hallucinating, and seeing, the pair of hallucinating and dreaming won 76% of times. This means that 76% of participants receiving this triple thought that it was seeing that *feels* most dissimilar to the other two mental states. Pairs that won *more frequently* than could be expected by chance alone (33.3%) are marked with asterisks (binomial test, * $p < .05$; ** $p < .01$; *** $p < .001$).

For most of the triples (8 out of 10), there was a clear 'winner', with neither of the other two pairs winning more frequently than could be expected by chance alone. There were two exceptions. First, there was no 'winner' in the triple 'Seeing; Hallucinating; Remembering'. Second, there were two 'winners' in the triple 'Imagining; Hallucinating; Remembering': the pair of hallucinating and imagining won 50% of time while the pair of imagining and remembering won 46% of time.

[2] Study data are available at: https://osf.io/v2zyn/?view_only=e67057be4ff84cf9a5cf11cdf446baac

Since each pair 'participated' in three different triples, I also aggregated the data (Figure 1b). There were four pairs that were 'winners' more frequently than could be expected by chance alone (33.3%): dreaming and imagining (68%, $p < .001$), hallucinating and dreaming (60%, $p < .001$), hallucinating and imagining (43%, $p < 001$), and remembering and imagining (39%, $p = .045$). Another four pairs were 'winners' less frequently than could be expected by chance alone: dreaming and seeing (8%, $p < .001$), hallucinating and remembering (13%, $p < .001$), seeing and imagining (18%, $p < .001$), and seeing and hallucinating (18%, $p < .001$).

Discussion. Study 1 is an attempt to study folk beliefs about phenomenological differences and similarities between kinds of mental states using an indirect method. Study participants were especially likely to think that dreaming and imagining *feel similar* to one another (closely followed by hallucinating and dreaming) while seeing and dreaming *feel dissimilar* to one another (closely followed by hallucinating and remembering). In Study 2, I address the same issue with a different method – asking study participants directly about specific pairs of mental states.

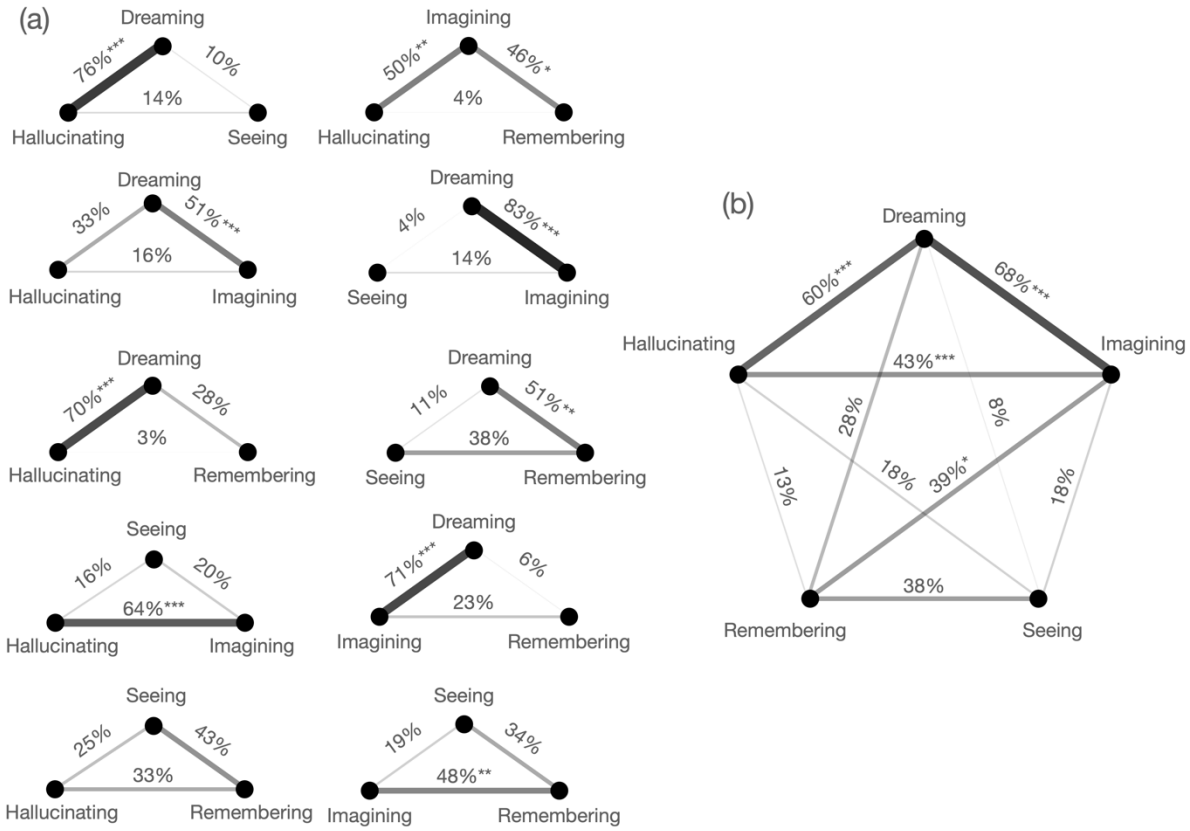

Figure 1. Results of Study 1 (N = 80). Percentages indicate how frequently a given pair of mental states 'won' in each triple (a) and overall (b). Pairs that won *more frequently* than could be expected by chance (33.3%) are marked with asterisks (binomial test, * $p < .05$; ** $p < .01$; *** $p < .001$).

Study 2. Conjoined pairs

Materials. Study participants read the following introduction to the task:

> This study is about what one *experiences* while having various mental states, about what *it feels like* to have various mental states.
>
> You will be provided with pairs of mental states and asked whether *it feels similar* or *different* to have them.

After reading this instruction, study participants evaluated pairs of mental states (e.g., 'Hallucinating and dreaming') on the scale from 1 (Very different) to 7 (Very similar). Here, as in the rest of the studies, the same five mental states were used as in Study 1. This results in ten pairs. Each pair was presented twice, with conjuncts swapped (i.e., 'Hallucinating and dreaming' and 'Dreaming and hallucinating'), so each participant had to provide twenty evaluations. These twenty tasks were presented in a random order.

Results. Since the data in Studies 2-7 are in most cases not normally distributed, I use non-parametric tests in this chapter. As a measure of effect size, I use non-parametric probability of superiority (Vargha and Delaney's *A* (Vargha and Delaney 2000); as implemented in R package *effectsize* (Ben-Shachar et al. 2020)). In a one-sample case, probability of superiority is a way to represent probability that an observation sampled at random will be larger than some value *mu*. I use 4 – the middle-point of the 1 to 7 scale – as the value of *mu* for one-sample analyses. In a paired-samples case, probability of superiority is a way to represent the probability that in a pair of observations sampled at random, the difference between the two observations will be larger than some value *mu*. For paired-samples analyses, I use 0 – representing that there is no difference between the two observations – as the value of *mu*. Values of probability of superiority range from 0 to 1, with .50 meaning that observations larger than 4 (or pairs of observations where the first observation is larger than the second one) are as probable as observations smaller than 4 (or pairs of observations where the first observation is smaller than the second one).

In Study 2, no differences were observed between claims with swapped conjuncts in any of the ten pairs (i.e., '*X* and *Y*' *vs* '*Y* and *X*,' paired-samples Wilcoxon signed-rank tests, all *p*s > .29). Therefore, for analyses, I averaged, for each participant, the two evaluations of the same pair of mental states. Mean and median scores of phenomenological similarity judgments for each pair of mental states are presented in Table 2. Results of one-sample Wilcoxon signed-rank tests comparing ascriptions of each pair to the middle of the scale (4) with probability of superiority as an effect size measure are also presented in Table 2. Please note that I use comparisons against the middle of the scale mostly to aid visualization of the data. I recommend against treating these comparisons as absolute measures of (dis)similarity ('study participants judge these two mental states to be phenomenologically (dis)similar') and rather suggest focusing on relative judgments ('study participants tend to see pair 1 as more (dis)similar than pair 2'). Until study participants' phenomenological (dis)similarity judgments are better understood, the use of 4 as a benchmark is a convenient yet somewhat arbitrary decision. Effect sizes are plotted in Figure 2. In tables and figures, I often indicate mental states by their first letters (H – hallucinating, D – dreaming, S – seeing, I – imagining, R – remembering). Thus, for example, HD indicates a pair of hallucinating and dreaming.

Pair		*M*(SD)	*Mdn*	*V*	*p*	*A*	95% CI
HD	Hallucinating; Dreaming	4.44(1.46)	5	1261	.023	.67	[.53; .78]
HS	Hallucinating; Seeing	3.36(1.53)	3.5	488	< .001	.26	[.16; .38]
HI	Hallucinating; Imagining	4.13(1.44)	4.5	1171	.381	.56	[.42; .69]
HR	Hallucinating; Remembering	2.70(1.35)	2.5	195	< .001	.08	[.05; .14]
DS	Dreaming; Seeing	3.21(1.30)	3	391	< .001	.19	[.12; .30]
DI	Dreaming; Imagining	5.08(1.29)	5	1787	< .001	.89	[.82; .93]
DR	Dreaming; Remembering	3.81(1.28)	3.5	827	.289	.42	[.29; .57]
SI	Seeing; Imagining	3.41(1.32)	3.5	431	< .001	.25	[.16; .38]
SR	Seeing; Remembering	3.39(1.35)	4	756	.733	.47	[.33; .62]
IR	Imagining; Remembering	4.08(1.32)	4	885	.479	.55	[.41; .69]

Table 2. Results of Study 2 (N = 69). Mean and median scores of phenomenological similarity judgments for each pair of mental states and results of one-sample Wilcoxon signed-rank tests with probability of superiority as an effect size measure (with 95% confidence intervals), comparing ascriptions of similarity to the middle point of the scale (4).

Two pairs of mental states were perceived as especially phenomenologically similar. Namely, dreaming and imagining, A = .89, followed by hallucinating and dreaming, A = .67. Hallucinating and remembering were perceived to be the most phenomenologically dissimilar, A = .08, followed by dreaming and seeing, A = .19, seeing and imagining, A = .25, and hallucinating and seeing, A = .26.

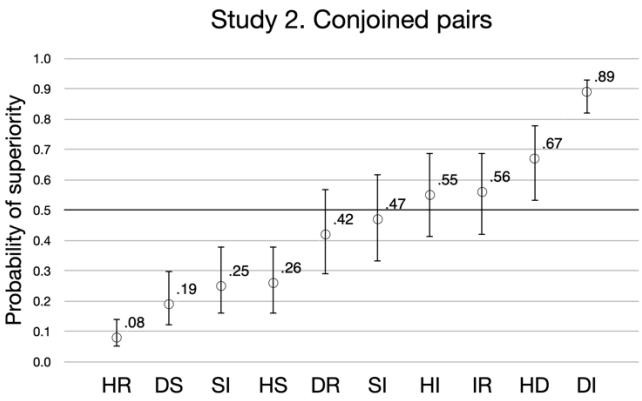

Figure 2. Results of Study 2 (N = 69). Probability of superiority of ascriptions of phenomenological similarity for each pair against the middle point of the scale (4). Error bars indicate 95% CI. Letter pairs represent (unordered) pairs of mental states (H – hallucinating, D – dreaming, S – seeing, I – imagining, R – remembering). For instance, HD denotes an (unordered) pair consisting of hallucinating and dreaming.

To get a better grasp of how ascriptions of phenomenological similarity differ between the pairs of mental states, I conducted a Friedman test, followed by Conover post-hoc tests. The Friedman test indicated that there were differences between ascriptions for different pairs of mental states, $\chi^2(9) = 152.489$, $p < .001$. Table 3 indicates probabilities of superiority for each *pair of pairs* of mental states (namely, probability that in a randomly selected pair of observations the score for a pair of mental states listed in the first column is larger than the score for the pair of mental states listed in the first row). Thus, probability of .98 in the top-right cell indicates that the pair 'dreaming; imagining' is vastly more likely to receive a higher ascription of similarity than the pair 'hallucinating; remembering.' Asterisks indicate whether the Conover post-hoc test for a given pair of pairs of mental states indicated a statistically significant difference (Holm-corrected for multiple comparisons; * $p < .05$; ** $p < .01$; *** $p < .001$).

	HD	IR	HI	SR	DR	HS	SI	DS	HR
DI	.73	.88**	.86*	.85***	.91***	.91***	.94***	.98***	.98***
HD	-	.61	.66	.67	.71	.82***	.80***	.86***	.97***
IR	-	-	.48	.57	.65	.70	.79	.81*	.91***
HI	-	-	-	.57	.63	.77*	.74	.80*	.95***
SR	-	-	-	-	.55	.67	.76	.80	.90***
DR	-	-	-	-	-	.63	.66	.74	.90***
HS	-	-	-	-	-	-	.47	.56	.79*
SI	-	-	-	-	-	-	-	.63	.81**
DS	-	-	-	-	-	-	-	-	.73

Table 3. Results of Study 2 (N = 69). Probabilities of superiority for each *pair of pairs* of mental states (probability that in a randomly selected pair of observations the similarity score for a pair of mental states listed in the first column is larger than the similarity score for the pair of mental states listed in the first row). Asterisks indicate whether a Conover post-hoc test for a given pair of pairs of mental states indicated a statistically significant difference (Holm-corrected for multiple comparisons; * $p < .05$; ** $p < .01$; *** $p < .001$). Letter pairs represent (unordered) pairs of mental states (H – hallucinating, D – dreaming, S – seeing, I – imagining, R – remembering). For instance, HD denotes an (unordered) pair consisting of hallucinating and dreaming.

Discussion. Study 2 used a different method than Study 1. However, the patterns of results in the two studies are nearly identical. Study participants thought that dreaming and imagining (as well as hallucinating and dreaming) are phenomenologically most similar while hallucinating and remembering (as well as dreaming and seeing) are phenomenologically most dissimilar.

Study 3. Ordered pairs. Specific

Over the next two studies, I investigated potential differences in similarity judgments within a pair. Perhaps study participants would be more willing to agree that '*X*-ing feels like *Y*-ing' than that '*Y*-ing feels like *X*-ing'. For example, perhaps they would be more likely to say that dreaming a tiger feels like seeing a tiger than they would be to say that seeing a tiger feels like dreaming a tiger. In Study 3, I used mental states with a specific content (namely, a tiger, i.e., 'Hallucinating a tiger; Dreaming a tiger; Seeing a tiger') while in Study 4, I used mental states in general (i.e., 'Hallucinating; Dreaming; Seeing'). Given similarities of Studies 3 and 4, I will not have a separate discussion section for Study 3 and discuss both studies together after results of Study 4 are presented.

Materials. Study materials were the same as in Study 2, with the following three differences. First, mental states with specific content (a tiger) were used (e.g., 'Dreaming a tiger feels like seeing a tiger'). Second, direction of comparison was specified. Thus, study participants had to evaluate both '*X*-ing feels like *Y*-ing' (e.g., 'Dreaming a tiger feels like seeing a tiger') and '*Y*-ing feels like *X*-ing' (e.g., 'Seeing a tiger feels like dreaming a tiger'). Third, study participants indicated their disagreement or agreement with the claims on the scale from 1 (Completely disagree) to 7 (Completely agree).

Results. Mean and median scores of phenomenological similarity judgments for each (ordered) pair of mental states are presented in Table 4, together with the results of one-sample Wilcoxon signed-rank tests comparing ascriptions of each pair to the middle of the scale (4) with probability of superiority as an effect size measure. Effect sizes are plotted in Figure 3a.

Study participants were especially inclined to agree that dreaming feels like imagining (A = .68) and that imagining feels like remembering (A = .65). They were the least inclined to agree that remembering feels like hallucinating (A = .09), and that seeing feels like dreaming (A = .10), imagining (A = .15), or hallucinating (A = .15). Figure 3 groups the claims by mental state. Thus, for instance, it is easy to see that, for remembering, study participants are the least inclined to think that remembering feels like hallucinating and the most inclined to think that remembering feels like imagining.

Given that each of the five mental states used in this study was compared to the remaining four, for each of these five groups of comparisons I conducted separate Friedman tests to check if ascriptions of similarity differ within a group. All five tests indicated statistically significant differences in similarity ascriptions (all ps < .001). Results of Friedman tests, Conover post-hoc tests, and probabilities of superiority for each *pair of pairs* of mental states are presented in Table 5.

I also calculated paired-samples Wilcoxon signed-rank tests to check if order of comparison matters. Namely, whether study participants are more inclined to agree that *X*-ing feels like *Y*-ing than that *Y*-ing feels like *X*-ing. Results of these pairwise comparisons are presented in Table 6 and plotted in Figure 4a. The largest asymmetries were observed in the following two pairs: hallucinating and seeing (A = .91; study participants were much more inclined to agree that hallucinating feels like seeing than they were to agree that seeing feels like hallucinating) and dreaming and seeing (A = .87; study participants were much more inclined to agree that dreaming feels like seeing than the other way around).

Pair		*M*(SD)	*Mdn*	*V*	*p*	*A*	95% CI
Remembering feels like …	Hallucinating	2.50(1.55)	2	358	< .001	.09	[.06; .14]
	Dreaming	3.70(1.57)	4	1301	.083	.39	[.28; .52]
	Seeing	3.79(1.51)	4	1235	.165	.41	[.29; .54]
	Imagining	4.33(1.57)	5	2041	.068	.61	[.49; .72]
Imagining feels like …	Remembering	4.43(1.67)	4.5	1964	.017	.65	[.53; .76]
	Hallucinating	3.05(1.70)	3	869	< .001	.21	[.14; .30]
	Dreaming	3.92(1.67)	4	1619	.699	.48	[.36; .60]
	Seeing	3.48(1.65)	3.5	1086	.002	.31	[.22; .43]
Dreaming feels like …	Remembering	4.15(1.62)	4	1955	.439	.55	[.43; .66]
	Hallucinating	3.43(1.78)	3	1186	.001	.30	[.21; .41]
	Seeing	4.13(1.59)	4	1822	.439	.55	[.42; .67]
	Imagining	4.55(1.67)	5	2423	.004	.68	[.56; .78]
Hallucinating feels like …	Remembering	2.99(1.55)	3	662	< .001	.17	[.11; .24]
	Dreaming	3.85(1.67)	4	1346	.325	.44	[.32; .56]
	Seeing	4.29(1.93)	4	2064	.140	.59	[.47; .70]
	Imagining	3.73(1.81)	4	1252	.073	.39	[.28; .51]
Seeing feels like…	Remembering	3.30(1.86)	3	1130	< .001	.28	[.20; .39]
	Hallucinating	2.82(1.81)	2	571	< .001	.15	[.10; .22]
	Dreaming	2.60(1.56)	2	395	< .001	.10	[.06; .15]
	Imagining	2.80(1.75)	2	644	< .001	.15	[.10; .23]

Table 4. Results of Study 3 (N = 100). Mean and median scores of phenomenological similarity judgments for each (ordered) pair of mental states and results of one-sample Wilcoxon signed-rank tests with probability of superiority as an effect size measure, comparing ascriptions of similarity to the middle point of the scale (4).

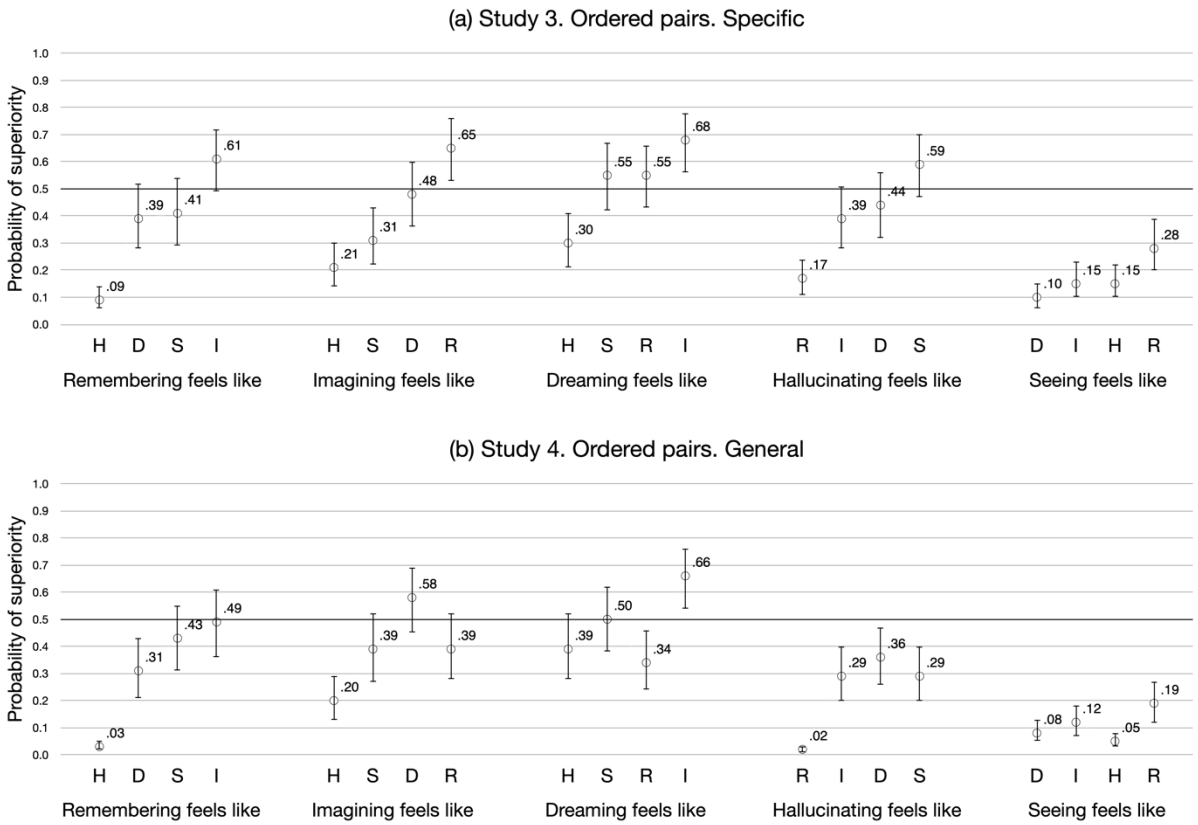

Figure 3. Results of Studies 3 (a; N = 100) and 4 (b; N = 97). Probability of superiority of ascriptions of phenomenological similarity for each (ordered) pair of mental states against the middle point of the scale (4).

Error bars indicate 95% CI. Letters represent mental states (H – hallucinating, D – dreaming, S – seeing, I – imagining, R – remembering).

Remembering feels like…			
$\chi^2(3) = 77.706$, $p < .001$			
	RS	RD	RH
RI	.68*	.74**	.92***
RS	-	.53	.85***
RD		-	.89***

Imagining feels like…			
$\chi^2(3) = 39.884$, $p < .001$			
	ID	IS	IH
IR	.64*	.78***	.84***
ID	-	.63	.80**
IS		-	.65

Dreaming feels like…			
$\chi^2(3) = 29.068$, $p < .001$			
	DR	DS	DH
DI	.63*	.65*	.82***
DR	-	.51	.71*
DS		-	.69*

Hallucinating feels like…			
$\chi^2(3) = 27.765$, $p < .001$			
	HD	HI	HR
HS	.63	.66	.86***
HD	-	.53	.77**
HI		-	.74**

Seeing feels like…			
$\chi^2(3) = 27.765$, $p < .001$			
	SH	SI	SD
SR	.62*	.66*	.75**
SH	-	.52	.59
SI		-	.61

Table 5. Results of Study 3 (N = 100). Probabilities of superiority for each *pair of pairs* of mental states (probability that in a randomly selected pair of observations the similarity score for a pair of mental states listed in the first column is larger than the similarity score for the pair of mental states listed in the first row). Asterisks indicate whether a Conover post-hoc test for a given pair of pairs of mental states indicated a statistically significant difference (Holm-corrected for multiple comparisons; * $p < .05$; ** $p < .01$; *** $p < .001$). Letter pairs represent (ordered) pairs of mental states (H – hallucinating, D – dreaming, S – seeing, I – imagining, R – remembering). For instance, RS denotes an (ordered) pair 'Remembering feels like seeing'.

X	*Y*	*W*	*p*	*A*	95% CI
Hallucinating	Dreaming	1126	.034	.66	[.52; .78]
Hallucinating	Seeing	2067	< .001	.91	[.85; .94]
Hallucinating	Imagining	1714	< .001	.77	[.66; .86]
Hallucinating	Remembering	1239	.003	.72	[.59; .83]
Dreaming	Seeing	3041	< .001	.87	[.81; .92]
Dreaming	Imagining	1668	< .001	.78	[.67; .86]
Dreaming	Remembering	1614	.006	.69	[.56; .79]
Imagining	Seeing	458	< .001	.77	[.65; .85]
Imagining	Remembering	1043	.811	.52	[.38; .65]
Remembering	Seeing	930	.012	.67	[.54; .77]

Table 6. Results of Study 3 (N = 100). Pairwise comparisons between two orders of presentation of pairs of mental states (*X*-ing feels like *Y*-ing *vs* *Y*-ing feels like *X*-ing). Results of paired-samples Wilcoxon signed-rank tests and probabilities of superiority comparing two different orders of presentation of a given pair of mental states (probability that participants agree with *X*-ing feels like *Y*-ing more than with *Y*-ing feels like *X*-ing).

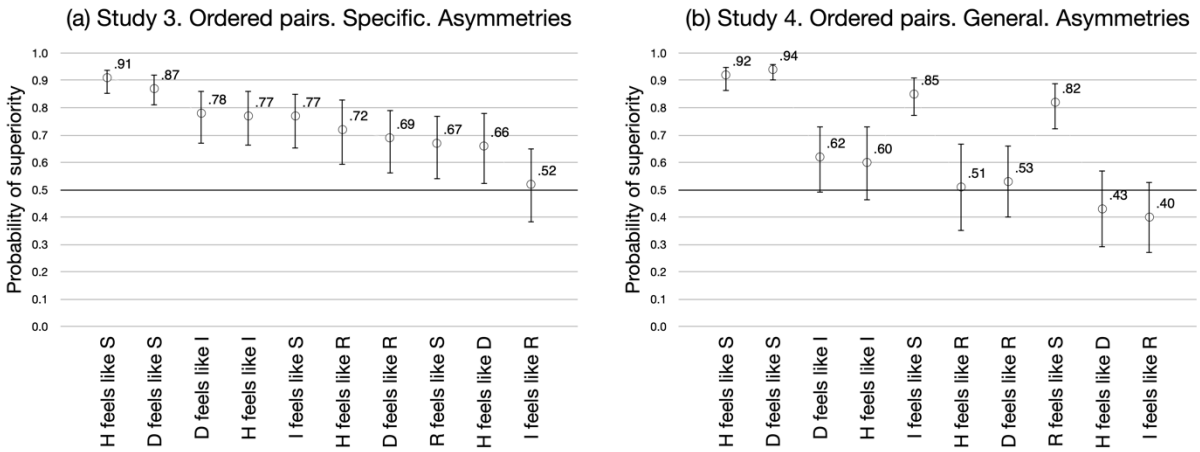

Figure 4. Results of Study 3 (a; N = 100) and Study 4 (b; N = 97). Probabilities of superiority comparing two different orders of presentation of a given pair of mental states. Higher numbers indicate that participants were more inclined to agree with the claim that *X*-ing feels like *Y*-ing (e.g., hallucinating feels like seeing; order of mental states as given in this figure) than they are to agree that *Y*-ing feels like *X*-ing (e.g., seeing feels like hallucinating; order of mental states opposite to that given in this figure). Error bars indicate 95% CI. Letters represent mental states (H – hallucinating, D – dreaming, S – seeing, I – imagining, R – remembering).

Study 4. Ordered pairs. General

In Study 4, phenomenological similarity judgments were collected for general claims of the form '*X*-ing usually feels like *Y*-ing' (e.g., 'Dreaming usually feels like hallucinating').

Materials. Study participants read the following instruction:

> This study is about what one *experiences* while having various mental states, about what it *feels like* to have various mental states.
>
> Please take a moment to think about experiences one usually has while *seeing*, *dreaming*, *hallucinating*, *imagining*, *remembering*.
>
> You will be provided with pairs of mental states presented in the following form: '*X-ing usually feels like Y-ing*.' You will be asked to indicate whether having the first one *usually feels like* having the second one, whether what one *experiences* while having the first is usually similar to what one *experiences* while having the second one.

After reading this instruction, study participants indicated their disagreement or agreement with the claims (e.g., 'Hallucinating usually feels like dreaming' and 'Dreaming usually feels like hallucinating') on the scale from 1 (Completely disagree) to 7 (Completely agree).

Results. Mean and median scores of phenomenological similarity judgments for each (ordered) pair of mental states are presented in Table 7, together with the results of one-sample Wilcoxon signed-rank tests comparing ascriptions of each pair to the middle of the scale (4) with probability of superiority as an effect size measure. Effect sizes are plotted in Figure 3b.

Study participants were especially inclined to agree that dreaming feels like imagining (A = .66) and imagining feels like dreaming (A = .58). They were the least inclined to agree that hallucinating feels like remembering (A = .02), remembering feels like hallucinating (A = .03), and seeing feels like hallucinating (A = .05), dreaming (A = .08) or imagining (A = .12).

Results of Friedman tests (all ps < .001) for each group of comparisons (comparing a given state to each of the remaining four states), Conover post-hoc tests, and probabilities of superiority for each *pair of pairs* of mental states are presented in Table 8.

As in Study 3, I also performed paired-samples Wilcoxon signed-rank tests to check if order of comparison matters. Results of these pairwise comparisons are presented in Table 9 and plotted in Figure 4b. As in Study 3, the largest asymmetries were once again observed in the following two pairs: dreaming and seeing (A = .94) and hallucinating and seeing (A = .92).

Ordered pair		*M*(SD)	*Mdn*	*V*	*p*	*A*	[95% CI]
Remembering feels like …	Hallucinating	2.23(1.25)	2	130	< .001	.03	[.02; .05]
	Dreaming	3.47(1.67)	3	1056	.002	.31	[.21; .43]
	Seeing	3.84(1.66)	4	1246	.253	.43	[.31; .55]
	Imagining	3.97(1.69)	4	1652	.815	.49	[.36; .61]
Imagining feels like …	Remembering	3.75(1.59)	4	1147	.095	.39	[.28; .52]
	Hallucinating	3.13(1.61)	3	648	< .001	.20	[.13; .29]
	Dreaming	4.23(1.63)	4	1728	.242	.58	[.45; .69]
	Seeing	3.73(1.63)	4	1104	.084	.39	[.27; .52]
Dreaming feels like …	Remembering	3.57(1.73)	3	1191	.011	.34	[.24; .46]
	Hallucinating	3.75(1.76)	4	1212	.097	.39	[.28; .52]
	Seeing	4.01(1.81)	4	1916	.997	.50	[.38; .62]
	Imagining	4.56(1.83)	5	2462	.010	.66	[.54; .76]
Hallucinating feels like …	Remembering	2.22(1.24)	2	76	< .001	.02	[.01; .03]
	Dreaming	3.60(1.95)	4	1368	.019	.36	[.26; .47]
	Seeing	3.32(1.92)	3	937	< .001	.29	[.20; .40]
	Imagining	3.39(1.74)	3	949	< .001	.29	[.20; .40]
Seeing feels like…	Remembering	3.00(1.78)	2	645	< .001	.19	[.12; .27]
	Hallucinating	1.99(1.40)	2	204	< .001	.05	[.03; .08]
	Dreaming	2.55(1.45)	2	293	< .001	.08	[.05; .13]
	Imagining	2.78(1.51)	3	387	< .001	.12	[.07; .18]

Table 7. Results of Study 4 (N = 97). Mean and median scores of phenomenological similarity judgments for each (ordered) pair of mental states and results of one-sample Wilcoxon signed-rank tests with probability of superiority as an effect size measure (with 95% confidence intervals), comparing ascriptions of similarity to the middle point of the scale (4).

Remembering feels like…
$\chi^2(3) = 67.295, p < .001$

	RS	RD	RH
RI	.55	.66	.92***
RS	-	.63	.89***
RD		-	.91***

Imagining feels like…
$\chi^2(3) = 24.609, p < .001$

	ID	IS	IH
IR	.36	.52	.70*
ID	-	.69*	.82***
IS		-	.66

Dreaming feels like…
$\chi^2(3) = 23.837, p < .001$

	DR	DS	DH
DI	.79***	.64*	.72***
DR	-	.39	.44
DS		-	.57

Hallucinating feels like…
$\chi^2(3) = 47.929, p < .001$

	HD	HI	HR
HS	.40	.47	.83***
HD	-	.59	.92**
HI		-	.91**

Seeing feels like…
$\chi^2(3) = 33.528, p < .001$

	SH	SI	SD
SR	.84***	.61	.72*
SH	-	.23***	.26*
SI		-	.61

Table 8. Results of Study 4 (N = 97). Probabilities of superiority for each *pair of pairs* of mental states (probability that in a randomly selected pair of observations the similarity score for a pair of mental states listed in the first column is larger than the similarity score for the pair of mental states listed in the first row). Asterisks indicate whether a Conover post-hoc test for a given pair of pairs of mental states indicated a statistically significant difference (Holm-corrected for multiple comparisons; * $p < .05$; ** $p < .01$; *** $p < .001$). Letter pairs represent (ordered) pairs of mental states (H – hallucinating, D – dreaming, S – seeing, I – imagining, R – remembering). For instance, RS denotes an (ordered) pair 'Remembering feels like seeing'.

X	*Y*	*W*	*p*	*A*	95% CI
Hallucinating	Dreaming	731	.329	.43	[.29; .57]
Hallucinating	Seeing	2150	< .001	.92	[.86; .95]
Hallucinating	Imagining	1210	.154	.60	[.46; .73]
Hallucinating	Remembering	505	.915	.51	[.35; .67]
Dreaming	Seeing	2746	< .001	.94	[.90; .96]
Dreaming	Imagining	1619	.082	.62	[.49; .73]
Dreaming	Remembering	1245	.659	.53	[.40; .66]
Imagining	Seeing	330	< .001	.85	[.77; .91]
Imagining	Remembering	928	.126	.40	[.27; .53]
Remembering	Seeing	335	< .001	.82	[.72; .89]

Table 9. Results of Study 4 (N = 97). Pairwise comparisons between two orders of presentation of pairs of mental states (*X*-ing feels like *Y*-ing *vs* *Y*-ing feels like *X*-ing). Results of paired-samples Wilcoxon signed-rank tests and probabilities of superiority comparing two different orders of presentation of a given pair of mental states (probability that participants agree with *X*-ing feels like *Y*-ing more than with *Y*-ing feels like *X*-ing).

Discussion. Studies 1 and 2 looked at phenomenological similarities between mental states without clearly indicating which mental state is taken as a basis for the comparison. In Studies 3 and 4, however, I explicitly indicated which of the two should serve as such a basis.

While the patterns of results in Studies 3 and 4 were not identical, they share a number of similarities. First, there are claims with which study participants are relatively inclined to agree (dreaming feels like imagining, remembering feels like imagining, dreaming feels like seeing) and also claims with which people are relatively inclined to disagree (remembering feels like hallucinating, hallucinating feels like remembering, seeing feels like dreaming, imagining, or hallucinating) in both specific and general forms. Effect sizes for similarity judgments in the two studies were strongly positively correlated ($r_s = .81$, $p < .001$). Second, in both studies, several asymmetries based on order of the members of the pair were observed. Most pronouncedly, study participants in both studies were much more inclined to agree that hallucinating feels like seeing than that seeing feels like hallucinating, and much more inclined to agree that dreaming feels like seeing than that seeing feels like dreaming. Effect sizes for pairwise comparisons between the two orders of presentation of pairs of mental states (i.e., measures of asymmetry in similarity judgments) in the two studies were strongly positively correlated ($r_s = .82$, $p = .010$).

Multidimensional scaling

As the next step, I applied multidimensional scaling (using PROXSCAL function in SPSS) to the data of Studies 1-4. Multidimensional scaling is a way to represent proximity (either dissimilarity or similarity) data as distances among points in a multidimensional space. The basic idea is often illustrated by a geographical example. Imagine that you have data on distances between towns. Your task is to construct a two-dimensional map that approximates these distances. Multidimensional scaling starts from some initial configuration (say, random distribution of towns in a two-dimensional space) and then these points are iteratively moved to improve the fit between the data and distances in this constructed map. In general, multidimensional scaling is used to assess whether a set of proximities can be represented in a small number of dimensions in a way that approximates the original proximities.

For this task, in Study 1, I treated percentages of 'wins' as a measure of similarity for a given pair of mental states (resulting in a triangular matrix). In Studies 2-3, I used mean scores of phenomenological similarity judgements as measures of similarity (resulting in full matrices). I followed the procedure described in (Borg, Groenen & Mair 2018: 111-115): ordinal scaling with the primary approach to ties, Torgerson initial configuration, stress convergence and minimum stress set to 0.0000001, and maximum iterations set to 1000. Scaling in a one-dimensional scale resulted in poor fit in each of the four studies (with

stress (Kruskal's type I) ranging from .11 to .23). Scaling in two-dimensional space, however, allowed almost perfect fit in all four studies (with stress lower than .0005).

Results of multidimensional scaling are presented in Figure 5. It is important to note that resulting configurations can be freely rotated or reflected to aid comparison (as was done in Figure 5) and interpretation, since neither rotation nor reflection changes inter-point distances. A very similar pattern emerged in all four studies. Can this pattern be interpreted in a way that (perhaps after additional rotation) would allow us to understand the dimensions along which folk beliefs about phenomenological similarity vary?

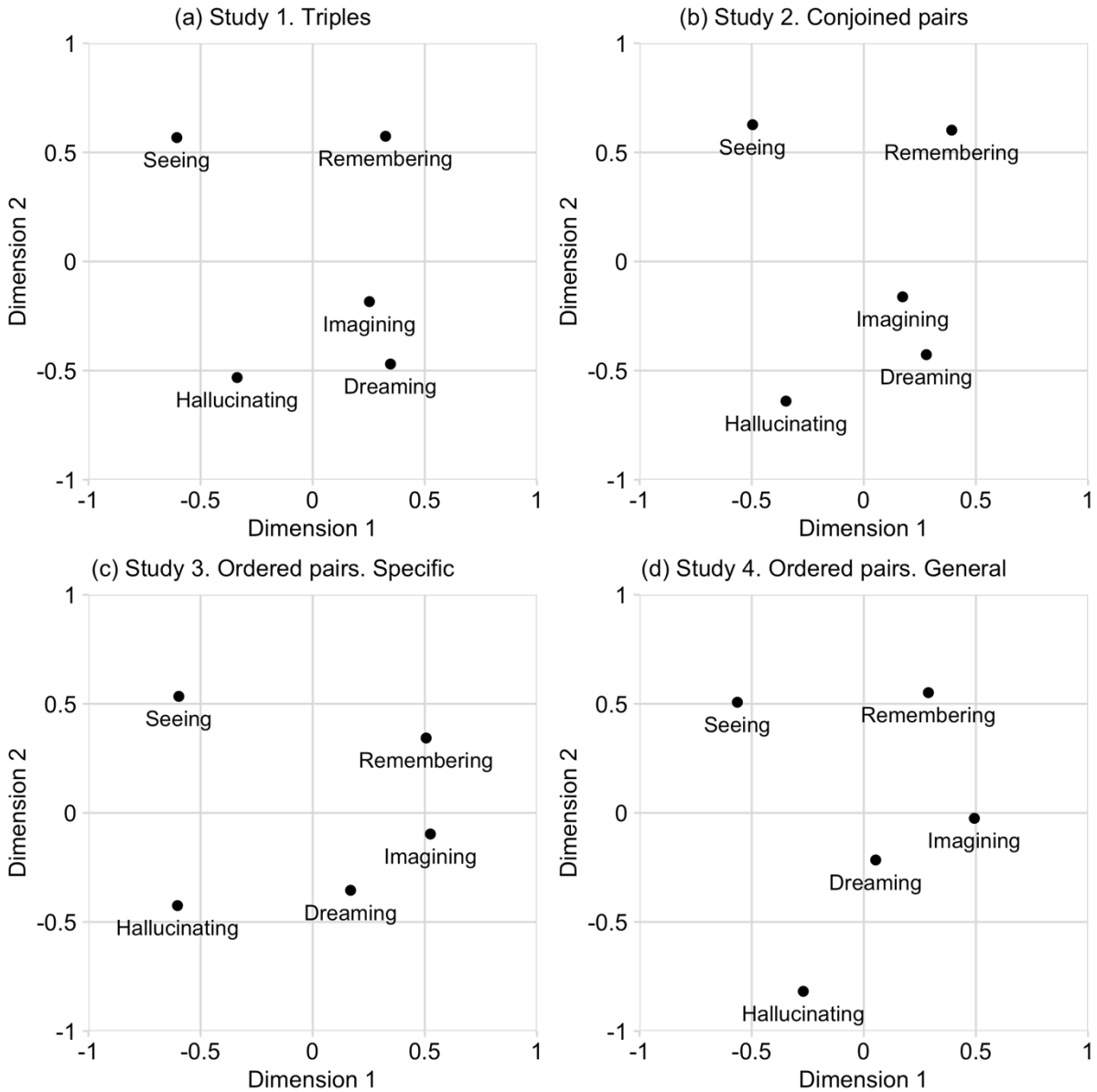

Figure 5. Multidimensional scaling of similarity data in Studies 1-4. Some of the resulting configurations are reflected/rotated to aid comparability.

Sometimes, dimensions resulting from multidimensional scaling can be interpreted straightforwardly. For example, in the previous toy geographical example it would be natural to interpret the resulting configuration in terms of East-West and North-South geographical directions (and then rotate/reflect the configuration accordingly, so that it realigns with cartographical conventions). In other cases, interpretations are not obvious and can provide evidence of complex criteria study participants use in their similarity or dissimilarity

judgments. For instance, in an oft-discussed study on overall similarity judgments about pairs of countries, Wish (1971) noticed that resulting two-dimensional representation can be interpreted as varying along one diagonal in whether countries are perceived as Underdeveloped/Developed and as Pro-Communist/Pro-Western along the other. Still in other cases, the dimensions remain uninterpretable.

While Figure 5 indicates that judgments of similarity of mental states exhibit a rather robust pattern across the four studies employing different methods, interpreting the pattern with any confidence is difficult, for several reasons. First, having only five items puts relatively little constraint on interpretation. To some extent, this could be addressed by adding additional mental states. Unfortunately, there are few candidates that could be used to expand the set of states. Daydreaming? Adding non-experiential mental states, such as believing? Second, plausible-sounding interpretations are too easy to concoct. I showed Figure 5 to several colleagues and usually they would quickly offer an interpretation. Interpretations included feeling involuntary/voluntary, feeling forceful/faint, feeling externally/internally oriented (reading left to right) and feeling constrained/unconstrained by reality, feeling wakeful/dreamlike, feeling suitable/unsuitable for belief formation (reading top to bottom). Still, in Studies 5a-c, I attempted, in an exploratory manner, to collect data that could potentially be useful in interpreting this two-dimensional pattern.

Studies 5a-c. Phenomenology of mental states

In this set of exploratory studies, I asked study participants to evaluate claims about whether mental states usually feel like involving something that is really happening or has really happened, and whether they usually feel like experiencing something that happens around you (**Study 5a. Reality and externality**), about whether mental states involve feelings of action and control (**Study 5b. Action and control**), and about their vividness and detail (**Study 5c. Vividness and detail**). The aim was to check if some of these patterns could be helpful in ruling out or motivating various possible interpretations of the two-dimensional pattern revealed by multidimensional scaling of similarity data in Studies 1-4.

Materials. In Study 5a, participants read the following instruction:

> This study asks whether mental states (i.e., dreaming, hallucinating, imagining, remembering, seeing something) (a) usually feel like involving something that is really happening or has really happened, and (b) whether they usually feel like experiencing something that happens around you (rather than in your own mind).

After reading this instruction, study participants indicated their disagreement or agreement with the claims of the following two forms on the scale from 1 (Completely disagree) to 7 (Completely agree):

> *X*-ing something usually involves a feeling that it is really happening or has really happened.
>
> *X*-ing something usually feels like experiencing something that happens around you (rather than in your own mind).

For each form, five claims were evaluated. In each claim, *X*-ing was replaced by one of the five mental states (dreaming, hallucinating, imagining, remembering, seeing). For example, "Dreaming something usually feels like experiencing something that happens around you (rather than in your own mind)." Thus, every participant evaluated ten claims.

In Study 5b, the following instruction was used:

> This study asks whether mental states (i.e., dreaming, hallucinating, imagining, remembering, seeing something) usually differ in whether they feel like something that one actively does (rather than something that just happens to one) and whether they feel like something one can easily control.

Since seeing usually involves a different – motor – kind of control, the following additional explanation was also included.

> While responding to these questions, please assume that the body and eyes do not move. The kinds of actions and control that I am interested in are mental actions and mental control, not bodily actions or control over the movements of your eyes.

Claim forms were the following:

> *X*-ing something usually feels like something that you actively do (rather than something that just happens to you).
>
> *X*-ing something usually feels like something one can easily control (e.g., switch to entertaining a different content).

Again, *X*-ing was replaced by one of the mental states (dreaming, hallucinating, imagining, remembering, seeing).

In Study 5c, the instruction read:

> This study asks whether mental states (i.e., dreaming, hallucinating, imagining, remembering, seeing something) usually differ in how vividly (or faintly) they are experienced and how detailed they are.

Claim forms were:

> *X*-ing something usually is very vivid.
>
> *X*-ing something usually contains a lot of detail.

Results. Mean and median scores for each claim used in Studies 5a-c and results of one-sample Wilcoxon signed-rank tests and probabilities of superiority (with 95% confidence intervals), comparing ascriptions of similarity to the middle of the scale (4), are presented in Table 10. Effect sizes are plotted in Figure 6a-c.

Mental state	*M*(SD)	*Mdn*	*V*	*p*	*A*	[95% CI]
X-ing something usually involves a feeling that it is really happening or has really happened.						
Seeing	5.80(1.51)	6	1064	< .001	.90	[.83; .95]
Remembering	5.26(1.75)	6	853	< .001	.86	[.76; .92]
Imagining	3.72(1.74)	3.5	365	.249	.40	[.25; .57]
Dreaming	4.58(1.61)	5	645	.013	.71	[.55; .83]
Hallucinating	4.26(1.87)	4.5	523	.368	.58	[.41; .73]
X-ing something usually feels like experiencing something that happens around you (rather than in your own mind).						
Seeing	5.72(1.73)	6	1041	< .001	.88	[.80; .94]
Remembering	3.66(1.86)	3	375	.232	.40	[.25; .57]
Imagining	3.28(1.55)	3	294	.004	.26	[.15; .40]
Dreaming	4.24(1.79)	4.5	493	.418	.57	[.40; .73]
Hallucinating	4.10(1.68)	4	468	.843	.52	[.35; .68]
X-ing something usually feels like something that you actively do (rather than something that just happens to you).						
Seeing	4.36(1.89)	5	578	.200	.61	[.44; .76]
Remembering	4.64(1.45)	5	592	.004	.76	[.61; .87]
Imagining	5.16(1.38)	5.5	941	< .001	.87	[.78; .93]
Dreaming	3.10(1.98)	2	316	.004	.27	[.16; .41]
Hallucinating	2.66(2.02)	2	152	< .001	.17	[.09; .29]

X-ing something usually feels like something one can easily control (e.g., switch to entertaining a different content).						
Seeing	4.42(1.58)	4	505	.048	.68	[.51; .82]
Remembering	4.58(1.36)	5	563	.004	.76	[.60; .87]
Imagining	5.44(1.30)	6	887	< .001	.94	[.88; .97]
Dreaming	2.88(1.79)	2	211	< .001	.20	[.12; .33]
Hallucinating	2.54(1.92)	2	182	< .001	.18	[.10; .29]
X-ing something usually is very vivid.						
Seeing	5.44(1.57)	6	862	< .001	.91	[.84; .95]
Remembering	4.54(1.22)	4	467	.003	.78	[.63; .89]
Imagining	4.80(1.34)	5	636	<. 001	.82	[.68; .90]
Dreaming	4.62(1.28)	5	584	.001	.79	[.64; .89]
Hallucinating	4.18(1.42)	4	427	.407	.58	[.40; .74]
X-ing something usually contains a lot of detail.						
Seeing	5.68(1.29)	6	996	< .001	.96	[.93; .98]
Remembering	4.58(1.34)	5	720	.002	.76	[.62; .86]
Imagining	4.84(1.25)	5	730	< .001	.85	[.73; .92]
Dreaming	4.28(1.42)	4	480	.198	.62	[.44; .77]
Hallucinating	4.00(1.29)	4	311	.953	.49	[.31; .68]

Table 10. Results of Studies 5a-c (N = 50 in each of the three studies). Mean and median scores for each claim used in Studies 5a-c and results of one-sample Wilcoxon signed-rank tests and probabilities of superiority (with 95% confidence intervals), comparing agreement with a given claim to the middle of the scale (4).

Discussion. Overall, none of the six claims about phenomenology of mental states explored in Studies 5a-c seem to provide a pattern of results that could be mapped neatly on the multidimensional pattern presented in Figure 5. However, I encourage readers to explore the results for themselves (please note that patterns in Figure 5 can be freely rotated). While Studies 5a-c provide only very limited help in interpreting dimensions of phenomenological similarity, the results can be interesting in their own right. For instance, the fact that study participants treated hallucinating as relatively poor in vividness and detail can strike some readers as unexpected.[3]

[3] Another striking result is that seeing was perceived as relatively active and controlled (as compared to dreaming and hallucinating). Here, however, I worry that instructions used in Study 5b were insufficient to completely rule out the bodily sense of action/control (such as in looking away or closing your eyes). Admittedly, the terms 'mental/bodily action' and 'mental/bodily control' are quasi-technical expressions that may be challenging to understand. Additional refinement of the study stimuli is necessary to address this concern.

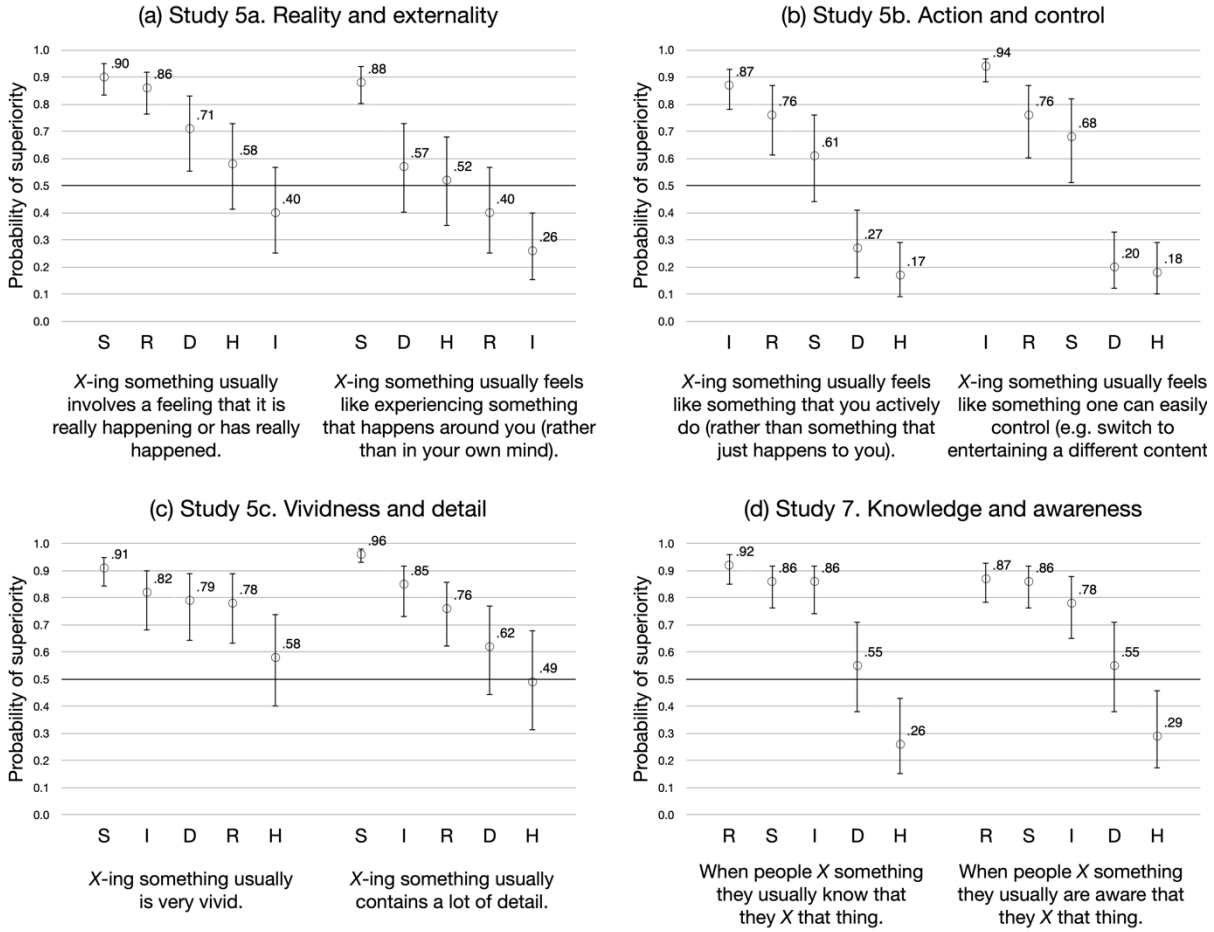

Figure 6. Results of Studies 5a-c (a-c) and 7 (d) (N = 50, each). Probabilities of superiority against the middle of the scale (4). Error bars indicate 95% CI. Letters represent mental states (H – hallucinating, D – dreaming, S – seeing, I – imagining, R – remembering).

Study 6. Mistakes

Next, I asked study participants to indicate whether they find some kinds of metacognitive errors (mistaking being in one kind of mental state for being in another kind of mental state) especially likely. The general idea is that believing that two states are phenomenologically similar may be associated with believing that such states can be mistaken for one another. Importantly, however, several interesting asymmetries in similarity judgments were observed in Studies 3 and 4. For instance, study participants were much more inclined to agree that dreaming feels like seeing than that seeing feels like dreaming. Consequently, we can expect that some kinds of mistakes will be seen as more likely. Thus, we can expect that study participants will see mistaking dreaming for seeing as more likely than mistaking seeing for dreaming.

Materials. Study participants read the following instruction:

> This study is about whether it is possible to be in one mental state (e.g., dreaming a tiger) while believing that one is in some other mental state (e.g., believing that one is seeing a tiger).
> You will read claims of the following form:
> 'John is *X*-ing a tiger, but he believes that he is *Y*-ing a tiger.'
> Assume that John is currently in a mental state *X*. How likely it is that, while being in state *X*, he believes that he is in state *Y*?

After reading the instruction, participants were asked to express their opinion about individual claims (twenty claims in total) on the scale from 1 (Very unlikely) to 7 (Very likely).

Results. Mean and median scores of judgments about how likely a given kind of metacognitive mistake is for each (ordered) pair of mental states, and results of one-sample Wilcoxon signed-rank tests and probabilities of superiority (with 95% confidence intervals), comparing ascriptions of similarity to the middle of the scale (4), are presented in Table 11. Effect sizes are plotted in Figure 7. Mistakes that were considered the most likely were mistaking hallucinating for seeing (A = .86), mistaking imagining for remembering (A = .80), and mistaking dreaming for seeing (A = .79). Mistakes that were considered the least likely were mistaking remembering for seeing (A = .20), mistaking seeing for remembering (A = .27), and mistaking remembering for hallucinating (A = .35).

Pair		*M*(SD)	*Mdn*	*V*	*p*	*A*	95% CI
Remembering	Hallucinating	3.58(1.69)	3.5	427	.061	.35	[.22; .50]
mistaken for	Dreaming	4.10(1.96)	4	640	.789	.52	[.36; .68]
…	Seeing	3.15(1.72)	3	205	< .001	.20	[.11; .33]
	Imagining	4.55(1.62)	5	700	.015	.71	[.55; .83]
Imagining	Remembering	5.05(1.75)	5	1021	< .001	.80	[.68; .88]
mistaken for	Hallucinating	3.87(1.84)	4	605	.584	.46	[.31; .61]
…	Dreaming	4.25(1.81)	4.5	640	.417	.57	[.40; .72]
	Seeing	3.87(1.83)	4	489	.568	.45	[.30; .62]
Dreaming	Remembering	4.70(1.57)	5	858	.002	.76	[.62; .86]
mistaken for	Hallucinating	4.05(1.70)	4	494	.806	.52	[.35; .62]
…	Seeing	4.87(1.73)	5	924	< .001	.79	[.66; .88]
	Imagining	4.73(1.66)	5	1040	.001	.75	[.62; .85]
Hallucinating	Remembering	4.32(1.67)	4	640	.162	.62	[.45; .76]
mistaken for	Dreaming	4.38(1.66)	4.5	693	.091	.64	[.48; .78]
…	Seeing	5.25(1.69)	6	1096	< .001	.86	[.76; .92]
	Imagining	4.71(1.57)	5	966	.001	.76	[.62; .86]
Seeing	Remembering	3.35(1.74)	3	305	.005	.27	[.16; .42]
mistaken for	Hallucinating	4.38(1.84)	4.5	733	.133	.62	[.46; .76]
…	Dreaming	3.75(1.80)	3.5	621	.288	.42	[.28; .57]
	Imagining	3.90(1.70)	4	569	.663	.46	[.31; .62]

Table 11. Results of Study 6 (N = 60). Mean and median scores of likelihood-of-a-mistake judgments for each (ordered) pair of mental states, and results of one-sample Wilcoxon signed-rank tests and probabilities of superiority comparing ascriptions of likelihood to the middle of the scale (4).

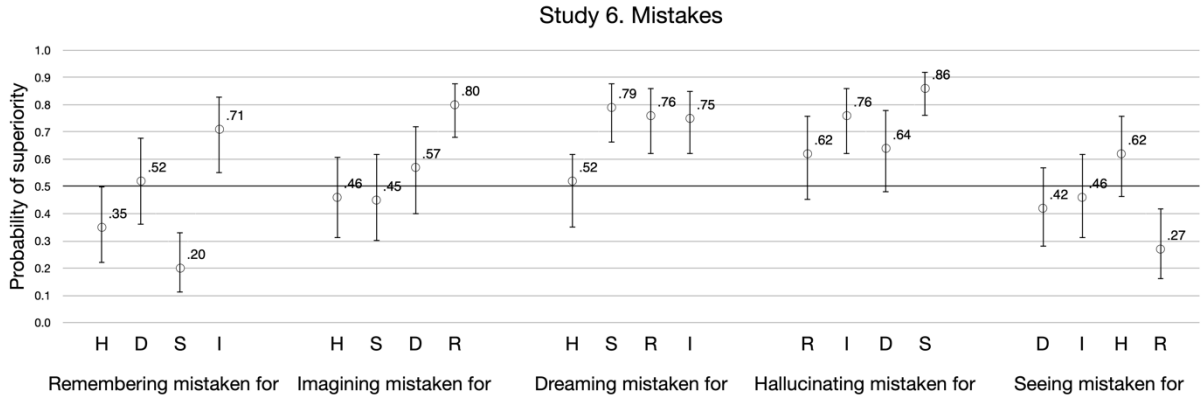

Figure 7. Results of Study 6 (N = 60). Probabilities of superiority for likelihood-of-a-mistake judgments for each (ordered) pair against the middle of the scale (4). Error bars indicate 95% CI. Letters represent mental states (H – hallucinating, D – dreaming, S – seeing, I – imagining, R – remembering).

Results of Friedman tests (all *p*s < .01) for each group of comparisons (likelihood of mistaking a given state for each of the remaining four states), Conover post-hoc tests, and probabilities of superiority for each *pair of pairs* of mental states are presented in Table 12.

Remembering mistaken for…			
$\chi^2(3) = 22.621$, $p < .001$			
	RS	RD	RH
RI	.90***	.63	.81*
RS	-	.18**	.29
RD		-	.71

Imagining mistaken for…			
$\chi^2(3) = 26.438$, $p < .001$			
	ID	IS	IH
IR	.76*	.81***	.86***
ID	-	.66	.69
IS		-	.47

Dreaming mistaken for…			
$\chi^2(3) = 11.791$, $p = .008$			
	DR	DS	DH
DI	.53	.46	.73*
DR	-	.46	.71*
DS		-	.74*

Hallucinating mistaken for…			
$\chi^2(3) = 12.910$, $p = .005$			
	HD	HI	HR
HS	.80*	.70	.82*
HD	-	.38	.54
HI		-	.66

Seeing mistaken for…			
$\chi^2(3) = 11.859$, $p = .008$			
	SH	SI	SD
SR	.21*	.32	.30
SH	-	.70	.71
SI		-	.55

Table 12. Results of Study 6 (N = 60). Probabilities of superiority for each *pair of pairs* of mental states (probability that in a randomly selected pair of observations the likelihood-of-a-mistake score for a pair of mental states listed in the first column is larger than the likelihood-of-a-mistake score for the pair of mental states listed in the first row). Asterisks indicate whether a Conover post-hoc test for a given pair of pairs of mental states indicated a statistically significant difference (Holm-corrected for multiple comparisons; * $p < .05$; ** $p < .01$; *** $p < .001$). Letter pairs represent (ordered) pairs of mental states (H – hallucinating, D – dreaming, S – seeing, I – imagining, R – remembering). For instance, RS denotes an (ordered) pair 'Remembering mistaken for seeing'.

I also calculated paired-samples Wilcoxon signed-rank tests to check if order of comparison matters. Namely, whether study participants are inclined to treat mistaking *X*-ing for *Y*-ing as likelier than mistaking *Y*-ing for *X*-ing. Results of these pairwise comparisons are presented in Table 13 and plotted in Figure 8. The most pronounced asymmetries were observed in the following four pairs: hallucinating and imagining (A = .83; mistaking hallucinating for imagining believed to be vastly more likely than mistaking imagining for hallucinating), hallucinating and remembering (A = .80; mistaking hallucinating for remembering more likely than the other way around), dreaming and seeing (A = .80; mistaking dreaming for seeing more likely than the other way around) and hallucinating and seeing (A = .79; mistaking hallucinating for seeing more likely than the other way around).

Discussion. While not identical, the pattern observed in Study 6 is rather similar to that observed in Study 3 – the two studies involving comparisons of mental states with specific content. There was a strong positive correlation between effect sizes for judgments about (ordered) pairs of mental states in Studies 3 and 6 (r_s = .68, p < .001): the more study participants are inclined to agree that *X* feels like *Y*, the more they are inclined to agree that mistaking *X* for *Y* is likely. Furthermore, out of nine asymmetries in similarity judgments observed in Study 3, six asymmetries were also observed in likelihood-of-a-mistake judgments in Study 6.[4] Study participants were much more inclined to say that hallucinating (or dreaming)

[4] Correlation analysis results for measures of asymmetry in Studies 3 and 6 were the following: $r_s = .51$, $p = .136$.

feels like seeing than that seeing feels like hallucinating (or dreaming) and they were also much more inclined to think that mistaking hallucinating (or dreaming) for seeing is likely than that mistaking seeing for hallucinating (or dreaming) is likely. Overall, Studies 3 and 6, taken together, provide some evidence that believing that mental state *X* feels like mental state *Y* is associated with believing that mental state *X* can be mistaken for mental state *Y*.

X	*Y*	*W*	*p*	*A*	95% CI
Hallucinating	Dreaming	570	.136	.63	[.46; .77]
Hallucinating	Seeing	554	.002	.79	[.64; .89]
Hallucinating	Imagining	613	< .001	.83	[.70; .91]
Hallucinating	Remembering	692	< .001	.80	[.67; .89]
Dreaming	Seeing	721	< .001	.80	[.66; .89]
Dreaming	Imagining	600	.009	.73	[.57; .85]
Dreaming	Remembering	415	.016	.74	[.56; .86]
Imagining	Seeing	318	.973	.50	[.32; .68]
Imagining	Remembering	599	.027	.70	[.53; .82]
Remembering	Seeing	227	.323	.40	[.24; .60]

Table 13. Results of Study 6 (N = 60). Pairwise comparisons between two orders of presentation of a pair of mental states (mistaking *X*-ing for *Y*-ing *vs* mistaking *Y*-ing for *X*-ing). Results of paired-samples Wilcoxon signed-rank tests and probabilities of superiority.

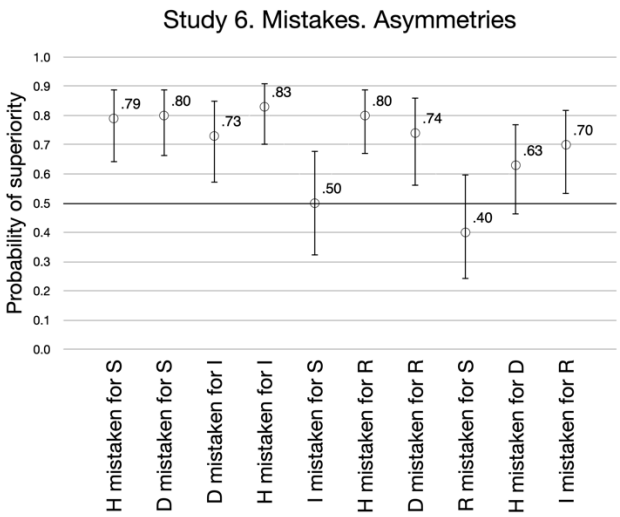

Figure 8. Results of Study 6 (N = 60). Probabilities of superiority comparing two different orders of presentation of a given pair of mental states. Higher numbers indicate that participants were inclined to treat mistaking *X*-ing for *Y*-ing (e.g., mistaking hallucinating for seeing, order as presented in the figure) as more likely than mistaking *Y*-ing for *X*-ing (e.g., mistaking seeing for hallucinating, order opposite to the one presented in the figure). Error bars indicate 95% CI. Letters represent mental states (H – hallucinating, D – dreaming, S – seeing, I – imagining, R – remembering).

Study 7. Metacognitive transparency

In this last study, I asked study participants to evaluate claims about metacognitive transparency of mental states. The aim is to check if these judgments could be helpful in interpreting the pattern of results in Study 6.

Materials. In Study 7, participants read the following instruction:

> This study asks whether people who are in a given mental state (i.e., when they dream, hallucinate, imagine, remember, see something) usually know/are aware that they are in that mental state (i.e., know/are aware that they dream, hallucinate, imagine, remember, see that thing).

After reading this instruction, study participants indicated their disagreement or agreement with the claims of the following two forms on the scale from 1 (Completely disagree) to 7 (Completely agree):

When people *X* something they usually know that they *X* that thing.

When people *X* something they usually are aware that they *X* that thing.

For each form, five claims were evaluated. In each claim, *X* was replaced by one of the mental states (dream, hallucinate, imagine, remember, see). For example, 'When people see something they usually know that they see that thing.' Thus, every participant evaluated ten claims.

Results. Mean and median scores for each claim used in Study 7 and results of one-sample Wilcoxon signed-rank tests and probabilities of superiority (with 95% confidence intervals), comparing ascriptions of similarity to the middle of the scale (4), are presented in Table 14. Effect sizes are plotted in Figure 4d.

Mental state	*M*(SD)	*Mdn*	*V*	*p*	*A*	[95% CI]
When people *X* something they usually know that they *X* that thing.						
See	5.40(1.63)	6	891	< .001	.86	[.76; .92]
Remember	5.38(1.29)	6	911	< .001	.92	[.85; .96]
Imagine	5.00(1.40)	5	668	< .001	.86	[.74; .92]
Dream	4.16(1.67)	4.5	523	.541	.55	[.38; .71]
Hallucinate	3.42(1.46)	3	185	.010	.26	[.15; .43]
When people *X* something they usually are aware that they *X* that thing.						
See	5.44(1.76)	6	970	< .001	.86	[.76; .92]
Remember	5.28(1.40)	6	984	< .001	.87	[.78; .93]
Imagine	4.86(1.54)	5	742	< .001	.78	[.65; .88]
Dream	4.12(1.76)	4	498	.558	.55	[.38; .71]
Hallucinate	3.52(1.47)	4	206	.025	.29	[.17; .46]

Table 14. Results of Study 7 (N = 50). Mean and median scores for the two claims used in Study 7 and results of one-sample Wilcoxon signed-rank tests and probabilities of superiority (with 95% confidence intervals), comparing ascriptions of similarity to the middle of the scale (4).

To check if patterns of responses in Study 7 can be potentially useful in interpreting the pattern in asymmetries in likelihood-of-a-mistake judgments (Study 6, Figure 8), I conducted the following procedure. First, for each pair of mental states, I calculated mean difference in judgments by subtracting the lower score from the higher score. Thus, for example, given that seeing received a higher awareness score (5.44) than did hallucinating (3.42), I used 1.92 (i.e., 5.44 – 3.42) as a difference score in awareness judgments for the pair of seeing and hallucinating. Second, I checked whether these difference scores are correlated to effect sizes of asymmetries in Study 6.[5] Difference scores in Study 7 were strongly positively correlated with asymmetry measures in Study 6 for both 'usually know' ($r_s = .87$, $p = .001$) and 'usually are aware' ($r_s = .87$, $p = .001$) measures. Thus, the larger the difference between two mental states in knowledge (or awareness) scores ($Y - X$, where Y is a mental state with a larger score than X), the more study participants are inclined to treat mistaking *X*-ing for *Y*-ing as more likely than mistaking *Y*-ing for *X*-ing.

Discussion. While study participants treated seeing, remembering, and imagining as relatively metacognitively transparent, they treated hallucinating as relatively metacognitively

[5] Please note that order of pair members is important for both difference scores (in Study 7) and asymmetry measures (in Study 6). Luckily, the same order as used in Study 6 (see Table 13) can be used in Study 7, since for each line of Table 13, mental state *Y* received higher scores than mental state *X* in both metacognitive transparency tasks in Study 7.

opaque, with dreaming falling in-between. These differences in metacognitive transparency judgments seem to be associated with the pattern of asymmetries in folk beliefs about likelihood of metacognitive mistakes in Study 6. A mental state that is believed to be less metacognitively transparent than some other mental state is also taken to be more likely to be mistaken for the other state than the other way around.

Wrapping-up

In this chapter, I reported the results of a set of exploratory studies on folk beliefs about phenomenological differences and similarities between dreaming, remembering, perceiving, imagining, and hallucinating. Let me summarize the main results.

As Studies 1 and 2 suggest, study participants were inclined to treat some pairs of mental states as phenomenologically relatively similar (dreaming and imagining; hallucinating and dreaming) and other pairs as phenomenologically relatively different (hallucinating and remembering; dreaming and seeing). Similarity judgments, however, were often sensitive to order of comparison, as shown in Studies 3 and 4. For instance, study participants were much more inclined to agree that hallucinating feels like seeing than that seeing feels like hallucinating, and much more inclined to agree that dreaming feels like seeing than the other way around.

Despite differences in methodologies, multidimensional scaling of similarity data from Studies 1-4 revealed a recurring two-dimensional structure. Study 5 was an attempt to collect some data that would be potentially helpful in interpreting the dimensions of phenomenological similarity, but this met with very limited success. Finally, Study 6 provides some evidence that beliefs about phenomenological similarity are associated with beliefs about how likely various metacognitive mistakes are, and Study 7 links these patterns in beliefs about metacognitive mistakes with beliefs about metacognitive transparency of various mental states.

I believe that studying folk beliefs about phenomenological differences and similarities between kinds of mental states is important not only because it contributes to our better understanding of folk psychology, but it can also be useful in trying to understand psychological underpinnings of philosophical concepts and theories. For example, the fact that study participants are more inclined to think that dreaming feels like seeing than that seeing feels like dreaming (and, consequently, take one kind of metacognitive error (mistaking dreaming for seeing) to be more likely than the other kind (mistaking seeing for dreaming)) could be useful in thinking about the psychological appeal of Cartesian dream skepticism. Studies reported in this chapter can also be seen as attempts to develop new methods for studying folk beliefs about the phenomenology of mental states. While still crude, the methods allowed me to recover several interesting patterns.

I would like to finish this chapter by acknowledging several limitations of the present approach that can hopefully be improved upon in future studies. First, it is not obvious that the results would generalize to other languages than English. This could be remedied only by collecting data in other languages. Second, due to the exploratory nature of the studies discussed in this chapter, individual results should be interpreted with considerable caution. Additional research is necessary to determine the replicability of these findings. In some instances, researchers may be interested in effect sizes that require larger sample sizes than those used in the current studies for reliable detection. Finally, it may seem that appeals to 'what one *experiences* while having various mental states' or '*what it feels like* to have various mental states' are open to different interpretations. Therefore, there is a possibility that (at least some) study participants thought not about the phenomenology of mental states but about concepts of mental states. To gather some information on how study participants understand tasks of the sort used in this chapter, I ran a small study (**Study 8. Justifications**; N = 42) which was identical to Study 4 except that study participants had to evaluate only one claim and were

also asked to explain their response in one or two sentences. The following claims were used in this study:

Dreaming usually feels like seeing.
Seeing usually feels like dreaming.
Remembering usually feels like imagining.
Imagining usually feels like remembering.

In the pair of dreaming and seeing (or seeing and dreaming), explanations did not contain any hints that study participants understood the task not in the intended way. Let me quote some of these explanations: 'Dreaming is more scattered and unrealistic, even when dreaming I think you kind of know that it isn't real' (F, 28); 'Seeing feels more real and focused than dreaming' (M, 23); 'I feel at times that seeing does have some form of surrealness to it which would feel like something like a dream' (M, 34); 'When you dream it is a very visual experience and it does feel like you are actually seeing the images' (F, 19).

In the pair of remembering and imagining (or imagining and remembering), however, the situation was more complicated. Most of the participants seemed to interpret the task in the intended manner. Let me quote some of these explanations: 'When imagining, I can see places and people clearly. I hear noises at times and feel feelings. When I remember, I experience all of that too - sometimes it's a happy experience, sometimes not' (F, 45); 'I think imagination strongly draws on memories, and does have a similar mental feeling to remembering as a result.' (M, 29). However, there was also a minority of participants who provided answers that do not refer to phenomenology and perhaps more likely reflect their thinking about the concepts of remembering and imagining, e.g., 'I find that imagining and remembering are two entirely different things' (F, 78) and 'Remembering is something that actually happened. Imagining is thinking about something that may or may not happen in the future' (F, 30). Future studies should attempt to refine the tasks to exclude such potentially non-phenomenological interpretations.

Summing up, the chapter introduced new methods to study pre-theoretical beliefs about phenomenological similarities and differences between kinds of mental states. This allowed me to recover several interesting patterns, including asymmetries in judgments of phenomenological similarity resulting from order of comparison as well as the relationship between beliefs about phenomenological similarity and beliefs about likelihood of metacognitive errors. I hope this chapter will encourage more researchers to study this topic.

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