

Assessing the Effects of Voluntary Mental Imagery Skills on Memory and Other Cognitive Functions



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Abstract

Aphantasia is a new name for an old concept: people that are unable to form clear mental images voluntarily. In this study, we attempted to verify and support some of the claims made in the relatively few published studies available on the topic. We were successful in doing so, as well as finding new significant correlations with other types of memory not previously studied.

Background

- As defined by Zeman (2015), aphantasia is divided into two groups that consists of a “no imagery,” a VVIQ score of 16, and a “minimal imagery,” a VVIQ score of 17-30.
- Faw (2009) surveyed 2,500 people and found a range of 2.1-2.7% reported a lack of visual imagery.
- Zeman (2015) hypothesized that aphantasia was more common in men, majority of his sample (19/21) were male.

Rationale/Purpose

The purpose of this study was to corroborate Watkins' (2018) claims about episodic memory deficits in people with aphantasia, as well as testing to see if there are other types of memory impacted by aphantasia as well. We also wanted to build a sample of people with aphantasia for future research.

Method

Participants

- 137 college students
- Mean Age: 19.92, SD: 0.17
- 25 Seniors, 40 Juniors, 34 Sophomores, 38 Freshman
- 18 Men, 117 Women

Materials and Procedure

- The Spontaneous Use of Imagery Scale (SUIS), the Vividness of Visual Imagery Questionnaire (VVIQ), the Survey of Autobiographical Memory (SAM), and questions about daydreaming and imaginary friends created by the authors
- Participants answered the questionnaires online via Longwood's Psychology Research Participation System (SONA)

SUIS

Please read each of the following descriptions and indicate the degree to which each is appropriate for you. Do not spend a lot of time thinking about each one, but respond based on your thoughts about how you do or do not perform each activity. If a description is always completely appropriate, please write "5"; if it is never appropriate, write "1"; if it is appropriate about half of the time, write "3"; and use the other numbers accordingly.

- When going to a new place, I prefer directions that include detailed descriptions of landmarks (such as the size, shape and color of a gas station) in addition to their names.
- If I catch a glance of a car that is partially hidden behind bushes, I automatically "complete it," seeing the entire car in my mind's eye.
- If I am looking for new furniture in a store, I always visualize what the furniture would look like in particular places in my home.
- I prefer to read novels that lead me easily to visualize where the characters are and what they are doing instead of novels that are difficult to visualize.
- When I think about visiting a relative, I almost always have a clear mental picture of him or her.
- When relatively easy technical material is described clearly in a text, I find illustrations distracting because they interfere with my ability to visualize the material.
- If someone were to tell me two-digit numbers to add (e.g., 24 and 31), I would visualize them in order to add them.
- Before I get dressed to go out, I first visualize what I will look like if I wear different combinations of clothes.
- When I think about a series of errands I must do, I visualize the stores I will visit.
- When I first hear a friend's voice, a visual image of him or her almost always springs to mind.
- When I hear a radio announcer or DJ I've never actually seen, I usually find myself picturing what they might look like.
- If I saw a car accident, I would visualize what had happened when later trying to recall the details.

Survey of Autobiographical Memory (SAM)

Please indicate the strength of your agreement with each of the following statements.

- 1 Strongly disagree
- 2 Disagree somewhat
- 3 Neither agree nor disagree
- 4 Agree somewhat
- 5 Agree strongly

Episodic (event)

- Specific events are difficult for me to recall.
- When I remember events, I have a hard time determining the order of details in the event.
- When I remember events, in general I can recall objects that were in the environment.
- When I remember events, in general I can recall what I was wearing.
- I am highly confident in my ability to remember past events.
- When I remember events, I remember a lot of details.
- When I remember events, in general I can recall which day of the week it was.
- When I remember events, in general I can recall people, what they looked like, or what they were wearing.

Semantic

- I can learn and repeat facts easily, even if I don't remember where I learned them.
- After I have read a novel or newspaper, I forget the facts after a few days.
- After I have met someone once, I easily remember his or her name.
- I can easily remember the names of famous people (sports figures, politicians, celebrities).
- I have a hard time remembering information I have learned at school or work.
- I am very good at remembering information about people that I know (e.g., the names of a co-worker's children, their personalities, places friends have visited, etc.).

Spatial

- In general, my ability to navigate is better than most of my family/friends.
- After I have visited an area, it is easy for me to find my way around the second time I visit.
- I have a hard time judging the distance (e.g., in meters or kilometers) between familiar landmarks.
- I get lost easily, even in familiar areas.
- If my route to work or school was blocked, I could easily find the next fastest way to go.
- I use specific landmarks for navigating.

Future

- When I imagine an event in the future, the event generates vivid mental images that are specific in time and place.
- When I imagine an event in the future, I can picture the spatial layout.
- When I imagine an event in the future, I can picture people and what they look like.
- When I imagine an event in the future, I can imagine how I may feel.
- When I imagine an event in the future, I can picture images (e.g., people, objects, etc).
- I have a difficult time imagining specific events in the future.

VIVIDNESS OF VISUAL IMAGERY QUESTIONNAIRE (VVIQ)

For each item on this questionnaire, try to form a visual image, and consider your experience carefully. For any image that you do experience, rate how vivid it is using the five-point scale described below. If you do not have a visual image, rate vividness as "1". Only use "5" for images that are truly as lively and vivid as real seeing. Please note that there are no right or wrong answers to the questions, and that it is not necessarily desirable to experience imagery or, if you do, to have more vivid imagery.

Perfecting clear and lively as real seeing 5
Clear and lively 4
Moderately clear and lively 3
Dim and vague; flat 2
No image at all, you only "know" that you are thinking of the object 1

For items 1-4, think of some relative or friend whom you frequently see (but who is not with you at present) and consider carefully the picture that comes before your mind's eye.

- The exact contour of face, head, shoulders and body _____
- Characteristic poses of head, attitudes of body etc. _____
- The precise carriage, length of step etc. in walking _____
- The different colours worn in some familiar clothes _____

Visualize a rising sun. Consider carefully the picture that comes before your mind's eye.

- The sun rising above the horizon into a hazy sky _____
- The sky clears and surrounds the sun with blueness _____
- Clouds. A storm blows up with flashes of lightning _____
- A rainbow appears _____

Think of the front of a shop which you often go to. Consider the picture that comes before your mind's eye.

- The overall appearance of the shop from the opposite side of the road _____
- A window display including colours, shapes and details of individual items for sale _____
- You are near the entrance. The colour, shape and details of the door _____
- You enter the shop and go to the counter. The counter assistant serves you. Money changes hands _____

Finally think of a country scene which involves trees, mountains and a lake. Consider the picture that comes before your mind's eye.

- The contours of the landscape _____
- The color and shape of the trees _____
- The color and shape of the lake _____
- A strong wind blows on the trees and on the lake causing reflections in the water. _____

Daydreaming and Imaginary Friend Questionnaire

- I frequently daydream
- When I daydream, I see images that are not present in the surrounding environment
- My daydreams do not consist of sounds or images
- At some point in my life, I had one or more imaginary friends
- My family was supportive of me having an imaginary friend
- I could physically see my imaginary friend
- My imaginary friend provided social and/or emotional support for me
- I have vivid mental imagery

Results

- Pearson correlation coefficient
- Mean and Standard Deviation descriptive statistic comparison

	SUIS	VVIQ	Episodic (SAM)	IFs and Daydreaming	Semantic (SAM)	Spatial (SAM)	Future (SAM)
SUIS	1						
VVIQ	** .49586	1					
Episodic	** .32208	** .52626	1				
IFs and Daydreaming	** .35700	** .37995	** .34181	1			
Semantic	.11488	* .20191	** .51373	.14189	1		
Spatial	** .25841	** .29513	** .36027	.00624	** .36523	1	
Future	** .55436	** .51542	** .45529	** .41086	** .27924	** .32018	1

** p < .01

* p > .01 but < .05

Mean and Standard Deviation Comparison

	Aphantasia (based on VVIQ score)	Rest of Sample
SUIS (Min. 12, Max. 60)	24.67 (9.17)	42.68 (0.68)
VVIQ (Min. 16, Max 80)	22.33 (3.28)	59.04 (0.98)
SAM (Episodic) (Min. 8, Max. 40)	17.67 (4.91)	26.26 (0.49)
IF and Daydreaming (Min. 9, Max. 45)	19.00 (5.51)	25.42 (0.58)
SAM (Semantic) (Min. 6, Max. 30)	16.00 (2.00)	19.14 (0.36)
SAM (Spatial) (Min. 6, Max. 30)	16.33 (2.19)	19.46 (0.36)
SAM (Future) (Min. 6, Max 30)	13.67 (3.84)	22.62 (0.37)

Discussion

- Three people out of the 137 (or ~2.19%) met Zeman's criteria for aphantasia, with one participant reporting no mental imagery at all, this is comparable to Faw's results. Moreover, Zeman's hypothesis about males being more likely to experience this is supported by our results, 1/18 men (~5.56%) met the criteria whereas 2/117 women (~1.71%) did. Despite this, more research with a larger sample is needed to definitively support Zeman's hypothesis.
- Our correlations also supports the research done by Watkins, as episodic memory had the most correlation with VVIQ scores.
- Future research may involve a possible connection between aphantasia and hypnotizability.

References

- Faw, B. (2009). Conflicting intuitions may be based on differing abilities - evidence from mental imaging research. *Journal of Consciousness Studies*, 16, 45-68.
- Watkins, N. W. (2018). (A)phantasia and severely deficient autobiographical memory: Scientific and personal perspectives. *Cortex: A Journal Devoted to the Study of the Nervous System and Behavior*, 105, 41-52. <https://doi.org/10.1016/j.cortex.2017.10.019>
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