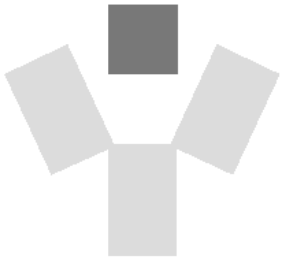
令和２年度　博士論文

Visual illusions in Parkinson's disease:An interview survey of symptomatology



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Introduction

The currently accepted National Institute of Neurological Disorders and Stroke–National Institute of Mental Health diagnostic criteria emphasize minor hallucinations as the most common psychotic phenomena in Parkinson's disease (PD).[1] Minor hallucinations comprise three types of hallucinatory experiences: presence hallucinations (or feeling of presence), passage hallucinations, and visual illusions. The latter are brief misperceptions of objects or living beings that differ from objective reality. Hallucinations involve the perception of an object that does not exist in the outside world. On the other hand, visual illusions involve seeing an object that exists in the outside world but is differently perceived from reality in some aspect(s). Visual illusions as aforementioned—i.e. a type of minor hallucination—are known as complex visual illusions. Moreover, there are simple visual illusions, where just one of an object's features is altered, including color, shape, size, distance, motion, tilt, number, or temporal aspects. Both complex and simple visual illusions may occur in PD.[2, 3, 4] Reported simple illusions in patients with PD include kinetopsia, dysmorphopsia, metachromatopsia, macro-/micropsia, tele-/pelopsia[2], selective diplopia[3], and tilt illusions.[4] Further, other illusion types have been reported after localized brain injury and in association with migraines and epileptic seizures. However, there has been no study on these illusion types can occur in PD; moreover, the only studies that have reported specific details regarding simple illusions in

patients with PD have exclusively focused on selective diplopia[3] or tilt illusions.[4]

This study aimed to investigate the types, prevalence, and details of visual illusions in patients with PD through an interview survey.

Methods

Participants

We included 40 patients with PD from the National Hospital Organization Akita National Hospital. PD was diagnosed based on the United Kingdom Parkinson's Disease Society Brain Bank criteria. We excluded patients with a history of central nervous system or psychiatric illness, evidence of non-PD-related abnormalities on cranial MRI, hearing loss, or binocular corrected near visual acuity < 0.5. Table 1 summarizes the demographic characteristics of the patients.

All the participants provided written informed consent after receiving detailed descriptions of the study. This study was approved by the ethical committee of National Hospital Organization Akita National Hospital and conducted in accordance with the Declaration of Helsinki.

Background motor and neuropsychological assessments

Patients were evaluated in the ‘ON’ state using the Unified Parkinson’s Disease Rating Scale

(UPDRS) Part III. General cognitive function was evaluated based on the Japanese version of the Montreal Cognitive Assessment (MoCA-J) score.[5] Long-term memory was evaluated according to the number of words recalled after a 30 min break on the Ray Auditory Verbal Learning Test (RAVLT). Visuospatial perception was evaluated based on the score in the overlapping figure identification task in the Visual Perception Test for Agnosia (VPTA).[6] Color vision was evaluated based on the number of correct responses on the City University Color Vision Test (CUCVT).[7] Furthermore, patients were evaluated based on the number of pareidolic responses confirmed on the Noise Pareidolia Test.[8]

Questions about visual illusions

First, the patient received detailed descriptions of the difference between hallucinations and visual (optical) illusions; moreover, they were informed that interview questions would specifically regard the latter. The researcher regularly confirmed their understanding throughout the interview and assured them not to be concerned since visual illusions are occasionally experienced by patients with PD and are not insanity signs. Subsequently, they were asked a series of yes-no questions regarding unrealistic visual perceptions since PD onset (Table 2A). In case of affirmative responses, specific details regarding the experience were requested. During the patients' account, the researcher verified that the event referred to an existing specific object

that existed in reality—e.g. when a patient said, “It looked like there were two of my TVs at home, side by side, on top of the TV stand”— to confirm it met the criteria for the visual illusion in question. Additionally, the patients were asked regarding the timing and frequency of each illusion. They were also asked whether they were still experiencing them, and if not, when they began and stopped as well as whether they had any difficulties in their daily life as a result of the occurrence of the type of visual illusion, using the language in Table 2B.

Questions were asked for each of the following visual illusions (Table 2A):

Metachromatopsia:	Object color appears different from that in reality[9]
Textural illusion:	Object surface appears different from that in reality
Dysmorphopsia:	Object shape appears distorted[10]
Macropsia:	Object appears larger than in reality[11]
Micropsia:	Object appears smaller than in reality[12]
Teleopsia:	Object appears more distant than in reality[13]
Pelopsia:	Object appears nearer than in reality[13]
Kinetopsia:	Stationary object appears to be moving[14,15]
Akinetopsia:	Moving object appears to be stationary[13]
Zeitraffer phenomenon:	Motion of object appears faster than in reality[17, 18]
Zeitlupen phenomenon:	Motion of object appears slower than in reality[17,19]

Tilt illusion: Orientation of the visual scene appears tilted[20]

Upside-down illusion: Orientation of the visual scene appears inverted[20]

Polyopia and cerebral diplopia involve the perception of a single object as two or more.[21] In polyopia, ≥ 2 objects appear side by side due to movement—by the patients themselves, their gaze, or the original object. On the other hand, in cerebral diplopia, the object 'increases' upon continuous viewing. Selective diplopia is a documented illusion in patients with PD, which is distinct from double vision caused by oculomotor dysfunction and is characterized by the doubling of a single object[3]. This dysfunction applies to both polyopia and cerebral diplopia. *Visual perseveration* refers to an illusion category involving the continual perception of an object after it has left the visual field. Based on the timing of the illusory perception, it can be categorized into the following three forms: *immediate perseveration*, if the object is still apparent just after its disappearance; *palinopsia*, if it returns after a few minutes; and *hallucinatory palinopsia*, if it recurs after days or weeks.[21] Further, the patients were asked about complex visual illusions.

When a patient confirmed experiencing akinetopsia, they were asked a supplementary question regarding if the scenery around the object also moved or not to confirm that the experience was not attributable to nystagmus. To differentiate between polyopia and cerebral diplopia, affirmative patients were also asked supplementary questions about whether their gaze,

body, or the focal object itself had moved before the apparent increase, as well as whether they were previously staring the object. To classify visual perseverations by type, supplementary questions were asked to determine the time passed between seeing the original object and the illusion perception.

In Table 2A, each question is followed by an arrow denoting the illusion/pathology—or pair requiring differentiation—recorded in the event of an affirmative (yes) response.

After going through the list of questions, the patients were asked if they had any other mysterious experiences besides the aforementioned specific illusions. Finally, they were given colored pencils and requested to draw a picture of what they had perceived, if possible (Table 2C).

Statistical analysis

Fisher's extract test and the Mann-Whitney-test was used to compare categorical and continuous variables, respectively, between groups with and without visual illusions.

Since there was a need to ensure that the reported illusions were not confabulations due to other conditions that can affect patients with PD, including amnesia and frontal dysfunction, we validated the questionnaire's test-retest reliability. Consequently, similar questions were asked after two weeks to a randomly selected subset of participants (n = 6/40). This second interview

was conducted by a different person blinded to the study details and the patients' initial responses. For all binary (Yes/No) questions in Table 1A, Cohen's kappa coefficient (κ) was calculated to measure the degree of agreement between the patients' first- and second-round responses.

Statistical processing was performed using IBM SPSS Statistics version 22 for Windows. Statistical significance was set at $P < 0.05$.

Results

Background motor and neuropsychological assessments

In total, 30 patients reported at least one visual illusion while 10 did not endorse any. There were no significant between-group differences in age, sex, education, Hoehn & Yahr stage, L-dopa daily dose, and color vision on CUCVT. The group with visual illusions had a longer disease duration, worse UPDRS part III score, general cognitive function on MoCA-J, long-term memory on RAVLT, and visual perception on the overlapping figure. The group with visual illusions produced a greater number of pareidolic responses on the Noise Pareidolia Test compared with those without visual illusions (Table 1).

Reported illusions

Figure 1 presents the number of patients who reported each illusion type surveyed in the questionnaire. Nearly every illusion was observed by at least one patient with the exceptions being immediate perseveration and hallucinatory palinopsia. Both polyopia and cerebral diplopia were collectively counted as selective diplopia since none of the affirmative patients could recall situational details (i.e. motion of gaze, self, object; prior starting) from before the illusory increase. The most commonly experienced illusions were dysmorphopsia (n = 14), complex visual illusions (n = 12), metachromatopsia (n = 11), and selective diplopia (n = 9). Some representative examples of different illusion types are given in Table 3.

Figure 1 presents some examples of patient drawings of experiences classified as selective diplopia, polyopia, and upside-down illusions.

A patient reported a concerning experience not included in the illusions identified in the questionnaire. Specifically, the complaint was “Sometimes the ground, hospital hallway, and rehabilitation room floor look like they are going downhill; therefore, I get scared and cannot walk anymore.” This was attributed to a novel illusion, where a surface’s orientation appears different from that in reality.

Responses were obtained from 26 of the 30 patients who endorsed any illusion(s) regarding whether they still occurred, as well as their frequency; among them, only 1 patient reported that

they had stopped experiencing illusions. Regarding their frequency, 5, 10, and 11 respondents reported seeing the illusion(s) 1-5 times per day, 0.5-3 times per week, and 0.5-3 times per month, respectively. Responses were obtained from 21 affirmative patients regarding the duration of illusion occurrence; specifically, 9, 10, and 2 patients reported it to be 1-2 months, 0.3-3 years, and 5-7 years, respectively.

Examples of the responses to questions regarding activities of daily living—i.e. whether they experienced difficulties as a result—are provided below.

Dysmorphopsia: "I get worried when the bed legs look bent to me but not to others. I start arguing with the nurse about those legs."

"The room's door sometimes looks distorted and slanted open from the top. I cannot shrink away and it is difficult to touch it and check when I can't move my body well."

Macropsia: "When just the handle of my mug appears bigger, my hand misses it when I go to pick it up."

Teleopsia: "When I sit on my bed, I have to deliberately feel around to check the distance from me."

Complex visual illusions: "When the table pattern looks like insects, it makes me want to use a different table: I get grossed out and cannot undergo

rehabilitation."

Additionally, the patient with an aberrant perception of surface orientation complained that "It bothers me when the floor starts looking like downhill during rehabilitation. I feel like, 'This again?'" Medical staff had noticed that the patient would occasionally stop walking and come to a standstill; however, it was attributed to freezing of gait.

The questionnaire had excellent test-retest reliability ($\kappa = 1.0$); specifically, the patients' first- and second-round responses were in complete agreement for all items.

Discussion

In total, 75% of the included patients reported having experienced some type of visual illusion, which suggests that the prevalence of visual illusions in PD may be quite high.

Compared with the group without illusions, the group with at least one illusion had a longer disease duration, as well as poorer motor function, general cognitive function, long-term memory, and visual perception. These deficits could be attributable to background factors responsible for—or share a common cause with—the appearance of optical illusions. However, patients with PD normally experience a decline in these functions with disease progression. Therefore, the between-group differences could merely reflect a parallel trend of an increased illusion prevalence associated with disease progression. Noise pareidolia was common among

patients who reported visual illusions. Noise pareidolia is very similar to certain complex illusions, including the perception of wrinkles in sheets as a human face reported by a patient. This is indicative of a close relationship between pareidolia and visual illusions. However, since the same argument as above still holds (i.e. noise pareidolia susceptibility may increase as the disease progresses, independently of visual illusion susceptibility), it is impossible to definitively draw this conclusion based solely on our results. Contrastingly, there was no between-group difference in the L-dopa daily dose or color vision. This finding is interesting since deficiencies in dopaminergic activation and color perception are often seen in PD; further, it suggests that illusion susceptibility is only weakly associated with these abilities.

The presence of varying illusions was determined based on the patients' reports. This study observed previously reported illusions, including kinetopsia, dysmorphopsia, metachromatopsia, macropsia, micropsia, teleopsia, pelopsia, selective diplopia, and tilt illusion. Tilt illusion has been reported in a case study of a single patient; however, its prevalence in our study was 3/40 patients, which suggests that this illusion type is not as rare as previously thought. Moreover, this study observed several illusion types only previously reported in cases of localized brain injury, epileptic seizures, or migraine headache. These include akinetopsia, Zeitraffer and Zeitlupen phenomena, upside-down illusion, polyopia (3+ images), and palinopsia. Additionally, one patient reported falsely perceiving the surface orientation (inclination), which had not been

specifically targeted in the questionnaire. Over the last century, there have been reports of pathologies generally affecting depth perception, including planar tilt.[22] To our knowledge, there has been no report of the *selective* pathology of the ability to judge surface orientation in cases of PD, localized brain injury, epileptic seizures, or migraine headache. The perception of this illusion may be associated with dysfunction of the intraparietal sulcus, which has been shown to selectively react to surface orientation in primate physiological experiments and human functional MRI studies.[23]

Most of the affirmative patients reported that the illusions remain present with the frequency ranging from a minimum of once every two months to a maximum of several times every day. This suggests that many patients with PD experience illusions with considerable frequency. The patients claimed that their illusions affected their lives in several ways, including worry, discomfort, arguments with individuals without illusions, misjudgments when grasping, the need for tactile confirmation, and stopping while walking. Furthermore, their narratives indicated some potentially dangerous illusions, including signboards and other surroundings appearing closer than in reality while driving, as well as a moving car on the highway appearing to stop suddenly. These findings indicate that systematic patient interviews regarding the incidence and details of visual illusions can offer important information for PD diagnosis and treatment.

Based on previous studies on patients with localized brain injuries and epilepsy, the sites of brain lesions responsible for some of the observed illusions can be surmised to a certain extent. For example, the temporo-parieto-occipital junction, superior parietal lobule, and intraparietal sulcus have been implicated in kinetopsia[14,15]. Further, the angular gyrus, occipitotemporal cortex, and secondary visual cortex have been implicated in the Zeitraffer phenomenon[18], micropsia[12], and cerebral diplopia[24], respectively. Functional MRI and other studies have demonstrated that the medial occipitotemporal cortex is critical for perception and recognition of color and texture.[25,26] Additionally, as aforementioned, regions necessary for perceiving surface orientation are located within the intraparietal sulcus .[23] Dysfunction in any one of these brain regions is likely to be associated with the corresponding type of visual illusion. However, this raises the question regarding how PD—a single clinical entity—presents with such a diverse range of illusions, with each being attributable to functional decline in different (respective) brain parts. Our findings cannot conclusively explain the underlying mechanism. However, all the aforementioned brain regions have been conjectured as places of aberrant function in PD.[27] Therefore, neural activity in these regions could be more prone to noise in patients with PD than in healthy adults. Acetylcholinergic neurons, which work to increase the neural signal-to-noise ratio by minimizing variability in firing rates across neurons, are dysfunctional in patients with PD.[28] Nishio proposed the mechanism of the visual illusions of

PD and Lew body disease as follows; under low acetylcholine states, information processing is susceptible to internal 'noise' originating from intrinsic functional deficits in various brain regions including the aforementioned regions.[29] This idea might answer the question previously described.

This study has several limitations. First, we might not be able to identify all possible visual illusions in PD due to the small number of patients. Second, this was a single-center study with a small population size, which indicates that our prevalence estimates—both for illusions generally and specific illusion types— may be inaccurate. Additionally, although we checked the test-retest reliability of our questionnaire instrument, not all participants were re-interviewed. Therefore, the risk that some responses were confabulations or other errors not grounded in real experiences cannot be completely discounted. These limitations should be addressed in a future large-scale multicenter study with its design incorporating repeated assessments.

Conclusion

This study showed that most of the surveyed patients with PD endorsed many types of illusions, with others being different from those previously documented in the PD literature. Not only visual illusions previously reported but also many other types of visual illusions have been reported in PD. Some illusions interfered with the patients' daily lives. Systematic patient

interviews regarding the incidence and details of visual illusions could offer important information for PD diagnosis and treatment.

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Authors' Roles;

Research project: Conception and Organization (CS, KY, KH), Execution (CS, HT, TH, KO, CW); Statistical analysis: Design and Execution (CS, KY), Review and Critique (KH); Manuscript: Writing of the first draft (CS, KH), Review and Critique (KY).

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None.

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Figure legends

Figure 1. The number of patients endorsing visual illusions according to type

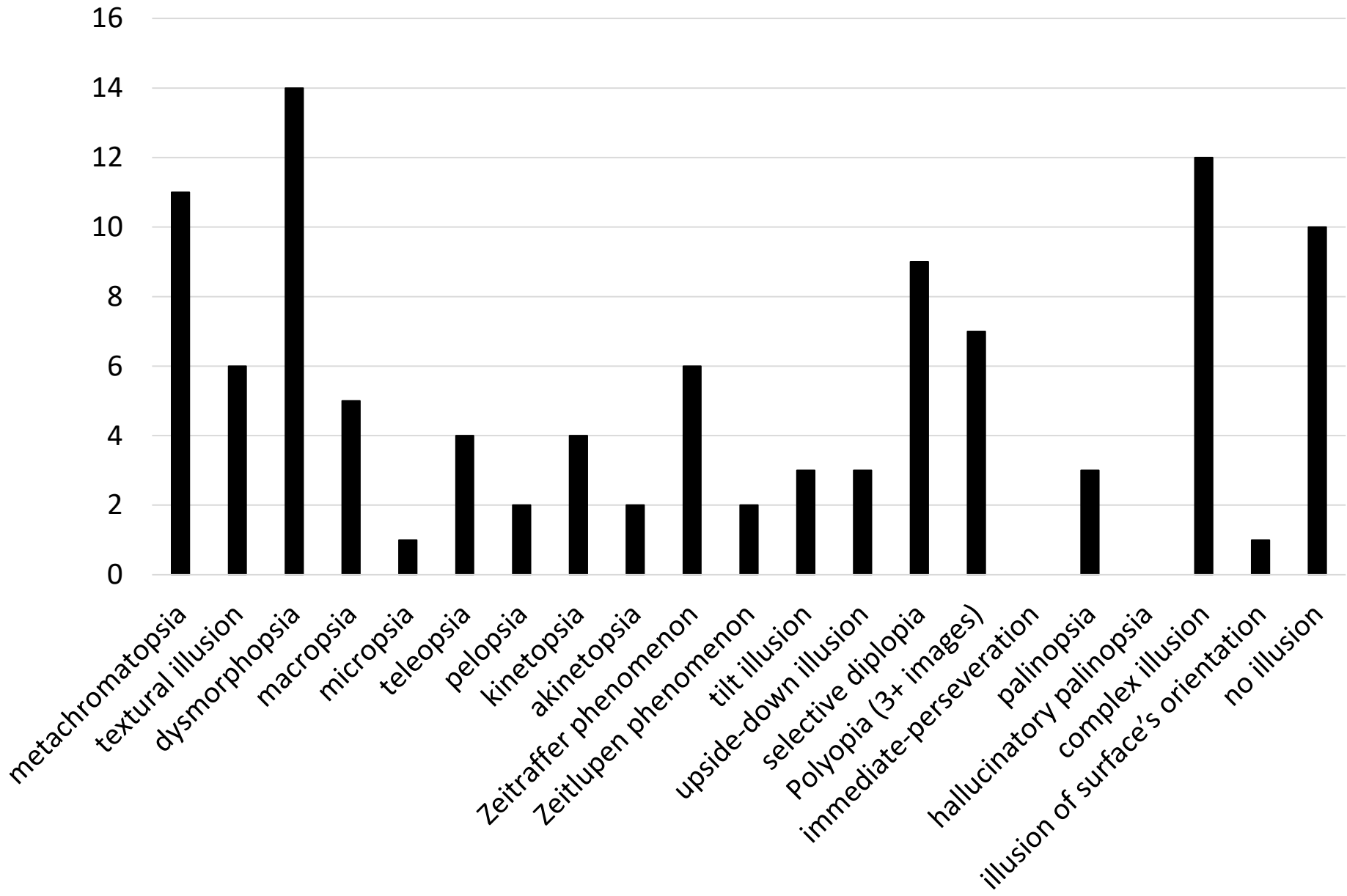
Figure 2. A selection of the patients' drawings of illusions.

a. Selective diplopia. The patient reported: "Just the upper body of a child at a nearby playground appeared to double." On the right of the drawing, she wrote the Japanese characters for "child" (子供).

b. Polyopia. A single cup on the table appeared as six cups.

c. Selective diplopia and polyopia. "There was just one building on a playground in the neighborhood; after looking at its roof, I could see one more roof behind it." (selective diplopia). "I saw three more poles when there was just one" (polyopia).

d. Upside-down illusion. The patient reported, "A utility pole in the neighborhood looked upside down. I could see the sky underneath it too." On the lower right of the drawing, she wrote the Japanese character for "sky" (空).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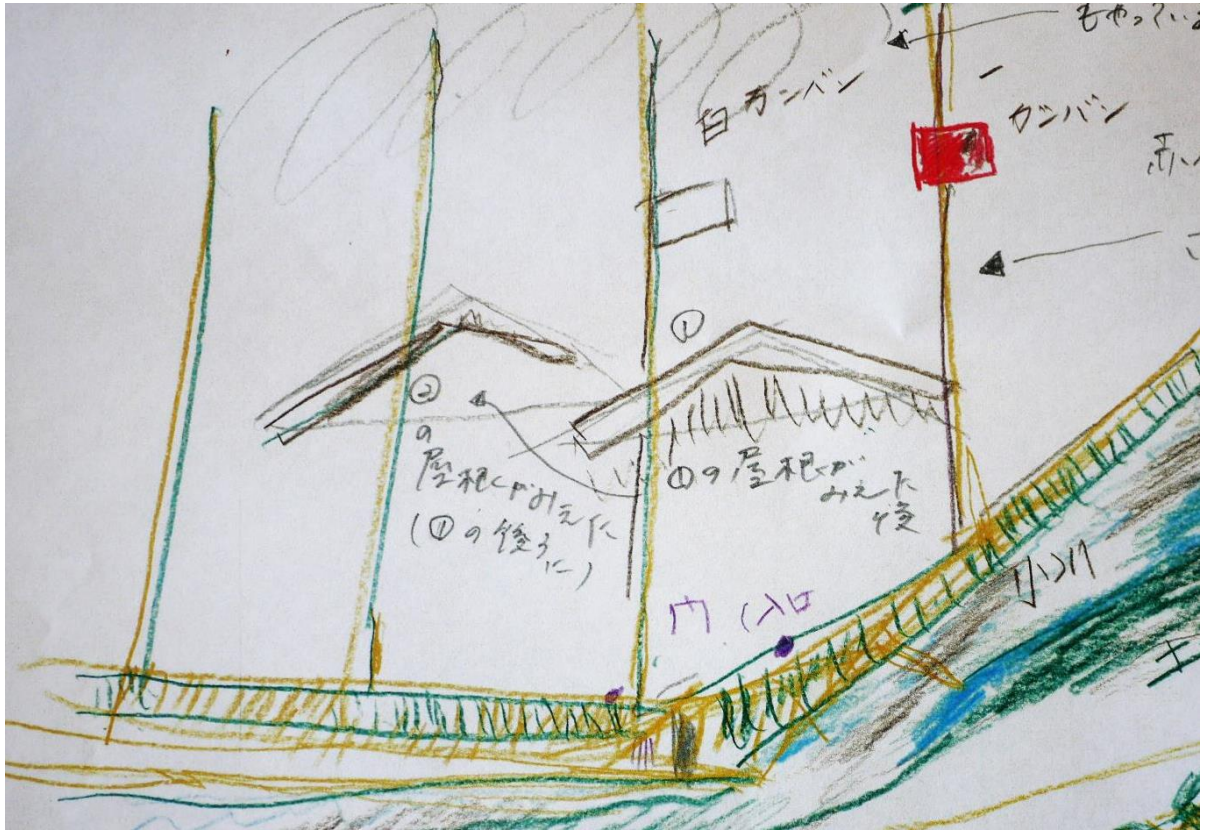
pelopsia
kinetopsia
akinetopsia
Zeitraffer phenomenon
Zeitlupen phenomenon
tilt illusion
upside-down illusion
selective diplopia
Polyopia (3+ images)
immediate-perseveration
palinopsia
hallucinatory palinopsia
complex illusion
illusion of surface's orientation
no illusion

Figure 1

a

b



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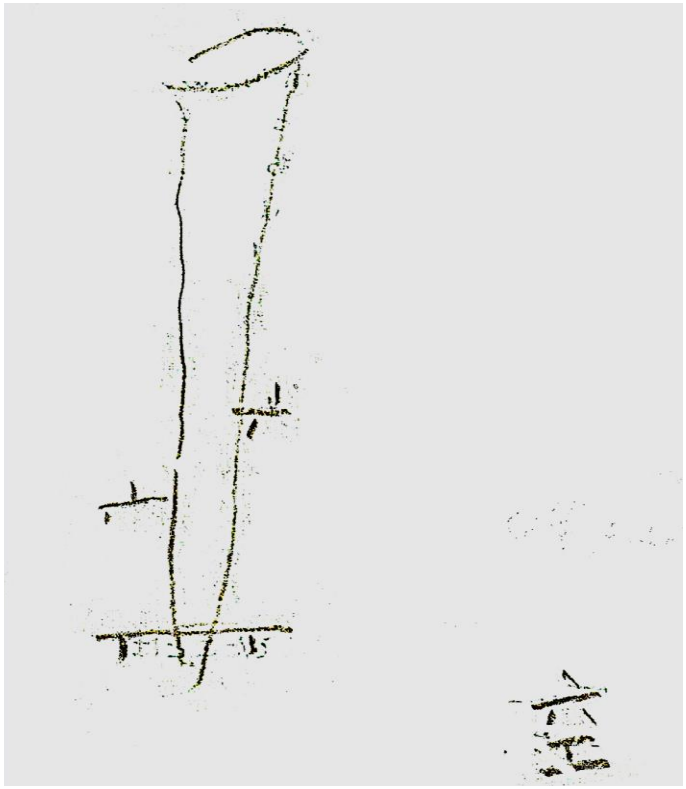

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Figure 2

Table 1 Demographic, clinical, and neuropsychological features of patients with PD with versus without visual illusions

	PD total (n = 40)	PD with visual illusions (n = 30)	PD without visual illusions (n = 10)	p-values
Age, years	64.4 (5.0)	65.0 (4.8)	62.4 (5.4)	0.140
Sex, men/women	21/19	17/13	4/6	0.473
Education, years	14.1 (2.1)	13.7 (2.1)	15.2 (1.7)	0.089
Disease duration, years	7.0 (3.6)	7.7 (3.4)	5.0 (3.3)	0.036
Hoehn & Yahr stage	2.5 (0.7)	2.6 (0.7)	2.2 (0.4)	0.067
MDS-UPDRS Part III	45.4 (20.9)	49.3 (21.8)	33.4 (12.4)	0.024
L-dopa daily dose, mg	81.5 (68.2)	69.8 (65.7)	85.5 (69.6)	0.770
CUCVT (Max:10)	9.1 (1.0)	8.9 (1.0)	9.6 (0.7)	0.067
MoCA-J (Max: 30)	26.3 (3.1)	25.5 (3.0)	28.8 (2.0)	0.001
RAVLT (Max: 15)	10.2 (1.7)	9.7 (1.5)	11.5 (1.4)	0.001
Overlapping figure (Max: 6)	1.0 (1.3)	1.3 (1.4)	0.2 (0.4)	0.018
Noise Pareidolia, %	10.0 (13.0)	12.8 (13.8)	1.5 (3.9)	0.004

PD, Parkinson's disease; MDS-UPDRS Part III, Movement Disorder Society-Unified Parkinson's Disease Rating Scale Part III; CUCVT, City University Color Vision Test; MoCA-J, Japanese version of the Montreal Cognitive Assessment; RAVLT, Ray Auditory Verbal Learning Test.

Data are shown as mean (Standard deviation).

Fisher's exact test and the Mann-Whitney-test were used for categorical and continuous variables, respectively. All p values are two tailed.

Table 2 Questions on Visual Illusions

A. The presence (or absence) of visual illusions

1. Has something that actually exists ever appeared to have a different color from its actual color? →metachromatopsia
2. Has the surface of something that actually exists seemed to appear different from its actual state? →textural illusion
3. Has a shape ever appeared to become distorted or deformed? →dysmorphopsia
4. Have things ever appeared to be bigger than what they actually were? →macropsia
5. Have things ever appeared to be smaller than what they actually were? →micropsia
6. Have things ever appeared to be farther away than where they actually were? →teleopsia
7. Have things ever appeared to be closer than where they actually were? →pelopsia
8. Have things that are not supposed to be moving ever appeared to be moving? →kinetopsia
   If yes, was the object's surroundings also moving? →not kinetopsia. nystagmus etc.
   Or did only that object move and not its surroundings? →kinetopsia
9. Have things that are supposed to be moving ever appeared to be stationary? →akinetopsia
10. Has the movement of an item ever appeared to be faster than its actual speed? →Zeitraffer phenomenon
11. Has the movement of an item ever appeared to be slower than its actual speed? →Zeitlupen phenomenon
12. Have things ever appeared to be tilted or upside-down as opposed to their actual direction?
    Please specify:
    Did they appear tilted? →tilt illusion
    Did they appear upside-down? →upside-down illusion
13. Has a single item ever appeared as though it were two or more items instead?
    a. How many did they appear to be?
       Did you see two items? →cerebral diplopia or polyopia (2+ images)
       Did you see more? → polyopia (3+ images)
       If there are more than three items, approximately how many were there?
    b. Did the item increase in number (after a while) when you were looking at them? →cerebral diplopia
    c. Did they increase in number when you looked away from them? →polyopia
    d. Did the item(s) only increase in number after (or while it was) moving? →polyopia
    e. Did the item(s) increase in number only when you moved (or while you were moving)? →polyopia
14. Have you ever seen something, then seen it again despite it no longer being there?

a. Have you ever experienced seeing something once, and then continued seeing the item despite the fact that it should no longer be there? →immediate-perseveration

b. Have you ever experienced seeing something once and, after a while, seen the item again despite the fact that it is no longer there? →paliopsia or hallucinatory palinopsia
If the response is "Yes," ask "After how much time did you see it?"
Image recurred after several minutes →palinopsia
Image recurred after several days to weeks →hallucinatory palinopsia

15. Has something that actually exists ever appeared to be something completely different? →complex illusion

B. Period and frequency of illusion occurrence, daily life-related problems, etc.

1. How long of a period has the optical illusion been occurring?
When does it begin and end?
Does it still persist?

2. How often does this optical illusion occur?
Please respond in the format of "a few times a day" or "once a month."

3. Have you experienced any difficulties in your daily life as a result of the occurrence of this type of visual illusion? What were the difficulties?

4. Is there anything you are concerned about regarding the optical illusions that we did not address?

5. If it is not too much to ask, could you draw an example of an optical illusion that you have experienced?

Table 3 Types of visual illusions and example of the patients' experience

Types of visual illusions	Example of the patients' experience
Metachromatopsia	Son's blue car appears yellowish-green or fluorescent green at times. Husband's dark-blue jacket appeared pale sky blue when it was returned from the dry cleaner. Her husband denied that the color had changed when she told him it had faded.
Textural illusion	The patient takes care not to trip while walking on a (flat) floor mat in hospital, which occasionally looked wavy and uneven. The pet guinea pig's fur looked stiff, like a hedgehog's [quills].
Dysmorphopsia	The hospital bed's shape appears bent at times, not straight, curving at the middle and distant points. A bicycle parked in front of the hospital appeared bent in two, at an angle of about 60°. Others faces look distorted at times.
Macropsia	Own smartphone appeared to be about as large as the son's tablet. A bicycle at the hospital looked about 1.5 times larger than the surrounding ones, despite being the same model.
Micropsia	An apple on top of a table appeared to be the size of a cherry.
Teleopsia	The bed's legs occasionally appear far away. Starting two weeks ago, a utility pole near the patient's house occasionally appeared to be about 30 meters distant.
Pelopsia	When driving, signboards and other surroundings occasionally appear closer than in reality. When going to the bathroom, the stair steps appear closer than in reality at times.
Kinetopsia	When putting a dog into its cage, the entire cage moves sideways at times. Moreover, the surrounding scene does not move in tandem. The wristwatch's rim appears to rotate at times. Blood vessels and other arm features sometimes appear to rotate in the opposite direction (of the rim) as well.
Akinetopsia	A bug, which others said was moving, appeared stationary to the patient. On the highway, a car driving in front of the patient seemed to

	suddenly stop, which caused him to change lanes; however, the car was still driving and was alongside him.
Zeitraffer phenomenon	A nursing assistant appeared to be walking at the speed of a bullet train. A clock's second hand suddenly and quickly made a complete revolution and returned to its original position.
Zeitlupen phenomenon	A clock's second hand appears to move more slowly at times. A ball hit by a student in a tennis court in front of the patient's house appeared to move slowly and appeared not to have arrived at the opponent when the latter swung the racket.
Tilt illusion	A doll at home appeared to be tilted to the left by about 45°. When a pet dog was digging a shallow hole, it appeared to do a 'handstand' on its front paws (by rotating 90°).
Upside-down illusion	An utility pole in the neighborhood appeared to be upside down, with the sky visible underneath. A friend's face appeared to be inverted.
Selective diplopia	A television at home appeared to be two units, side by side, on top of the single TV stand. A normal medicine cup appeared as two cups, one atop the other, suspended in midair.
Polyopia (3+ images)	A single (upright) pencil appeared as three pencils (lined up side by side). A soap bar in the washroom appeared as four bars (stacked on top of each other)
Palinopsia	An occupational therapist's face 're-appeared' for 3-4 minutes at 3-4 minutes after completion of the rehabilitation training. Chopsticks used for a meal 're-appeared' after two hours.
Complex visual illusion	Wrinkles in sheets occasionally perceived as a human face. Felt grossed out by a table pattern, which perceived as moving insects, in an occupational therapy room. A tree at the hospital appeared to be a young woman.