Developing a Short-term Phenomenological Training Program: A Report of Methodological Lessons

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Abstract

We discuss our attempts to develop a *short-term phenomenological training program* for training naïve participants in phenomenological skills. After reviewing existing methodologies for collecting phenomenological data and clarifying the benefit of the short-term training approach, we present two training programs and two experiments that tested their effectiveness. Experiment 1 tested the *two-stage training program*, which consists of (i) the *illusion training* which instructs participants to describe the experience of a visual illusion and (ii) the *guidance training* which offers individualized feedbacks for improving their description. This program proved effective, but also excessively skill-demanding. Experiment 2 tested the *one-stage training program*, consisting only of the illusion training; it was easier to use, but exhibited a smaller training effect. The paper concludes by delineating methodological lessons from the experiments focusing on three themes: (i) Individual difference in phenomenological aptitude; (ii) Bounded transferability of phenomenological skills; (iii) Active intervention in the learning process.

1. Introduction

Many agree that further progress in experimental psychology requires the coordination between objective, third-personal methods and first-personal, phenomenological, or subjective methods of inquiry. One influential methodological proposal for achieving such coordination is *neurophenomenology* (Lutz & Thompson, 2003; Valenzuela-Moguillansky, Vasquez-Rosati, & Riegler, 2017; Varela, 1996), an experimental paradigm for coordinating behavioral and neural data with *phenomenological data* – that is, subjective reports or descriptions collected from the experimental subjects about their conscious experience – in mutually constraining ways.[1]

One immediate question that arises in response to neurophenomenology concerns the methods for collecting reliable phenomenological data. Articulating subjective features of one's experience is a difficult task. One can fail to do so in many different ways. For one thing, it is already difficult to be clear about the task itself. On being asked to describe the key subjective features of one's experience, one can simply be lost about the request in the first place. Even when the request itself is squarely understood, as Claire Petitmengin points out, one can easily go awry when actually trying to meet it: one might fail to focus well enough on the experience to develop careful descriptions; one might inadvertently describe objective features of what one is experiencing instead of subjective features of the experience itself; one might base their report not on their first-hand experience, but on their second-hand knowledge about mind and consciousness, etc. (Petitmengin 2006, pp. 233-239) In fact, there are even psychological studies indicating that our verbal reports on our own mental processes are highly unreliable (Nisbett & Wilson 1977). Given all these complications, how can we obtain reliable phenomenological descriptions from experimental subjects? Call this the *problem of phenomenological data collection*.

[1] Another way of achieving such coordination is by having the experimenters undertake phenomenological descriptions (Gallagher & Zahavi, 2012) or systematic introspections (Weger & Wagemann, 2015) of their own experience.

Researchers engaged in neurophenomenology have addressed this problem in various ways. Existing approaches to the problem, however, tend to be exceedingly 'expensive' in that they require either the experimenter or the experimental participants to undergo distinctly time- and effort-consuming trainings. We have no doubt they will contribute to the development of neurophenomenology by producing quality research, but we worry that they might make the paradigm highly inaccessible to a wide range of experimenters interested in starting to investigate the subjective features of conscious experience. To improve the accessibility to neurophenomenology, in this study, we pursue a 'cheaper' solution to the problem of phenomenological data collection: that is, we propose to solve it by developing a *short-term phenomenological training program*, that is, a systematic training program that can equip naive experimental subjects with the ability to produce reliable descriptions of their experience in a very short period of time. The objective of this paper is to report the results of our experiments testing the effectivity of such programs and to discuss their methodological lessons.

To be clear from the outset, the experiments were still at the pilot stage and the results were mixed. We nevertheless think it would be valuable to share them with the research community so that others will have the opportunity to learn from our attempt. Neurophenomenology is a young paradigm. Many neurophenomenological studies have been successfully carried out, for example, with respect to preictal states that precedes epileptic seizures (Petitmengin, Baulac, & Navarro, 2006; Petitmengin, Navarro, & Le Van Quyen, 2007), the sense of body ownership in rubber hand illusion experiments (Valenzuela-Moguillansky, O'Regan, & Petitmengin 2013), altered self-experiences in meditative and psychedelic states (Millière, Carhart-Harris, Roseman, Trautwein, & Berkovich-Ohana, 2018), yet the methodology is far from established. Reports and analyses of attempts to sophisticate the method should prove invaluable for the future development of the field (Bockelman, Reinerman-Jones, & Gallagher, 2013). We aim to contribute to the development of neurophenomenology in this way by clarifying some difficulties with developing a short-term training approach to it.

The rest of the paper is structured as follows. The next section situates our project in the landscape of neurophenomenology by offering a taxonomy of existing methods for collecting phenomenological data. Section 3 introduces the *two-stage phenomenological training program*, which consists of two stages of trainings: *illusion training* and *guidance training*. Section 4 discusses Experiment 1 which tested the effectiveness of this program. Section 5 presents Experiment 2, a follow-up experiment that tested the effectiveness of a one-stage training program consisting only of the illusion training. Section 6 reports our observations of the experimental results and discusses their methodological implications.

2. A taxonomy of methods for phenomenological data collection

How can neurophenomenologists collect reliable phenomenological data? Different approaches are proposed to answer this methodological challenge. In what follows, we introduce four existing approaches that represent the current state of art: two approaches that involve experimental participants who have received some form of special training for developing phenomenological skills, the *long-term training approach* and the *short-term training approach* (Section 2.1); two approaches that do not require special trainings on the part of the participants, the *phenomenological interview approach* and the *questionnaire approach* (Section 2.2). Each approach is considered as a final consequence of taking different paths on a decision tree with three decision nodes (**Figure 1**).[2]

A few notes are in order before moving on. First, the following only concerns approaches to the problem of phenomenological data collection developed within the domain of experimental psychology. This means that phenomenological methodologies developed for qualitative studies in psychology, such as Amedeo Giorgi's modified Husserlian approach (Giorgi 2009), falls out of the scope of the current review (see Langdridge 2007 for an extensive review of phenomenological

[2] Solomonova & Sha (2016) sketches a similar classification of different methods for collecting first-person reports of dream experience (Solomonova & Sha, 2016, p. 414).

approaches in qualitative psychology). Second, the four approaches are not meant to be mutually exclusive: It is possible that they be combined or coordinated within a single experiment. This is not a taxonomy of *competing* approaches to the problem of phenomenological data collection. Third, the goal of the taxonomy is to provide a systematic viewpoint which allows us to have a better grasp of the theoretical landscape and not to give a detailed description of each and every available option. Accordingly, some approaches that deserve much more attention in its own right are only briefly mentioned in the following.

2.1 The Training Approaches

The first node ("Training") separates the existing approaches into two classes: those that involve a *phenomenological training* on the subject and those that do not. The second node ("Duration") separates the former into two sub-classes, namely, *long-term training* and *short-term training* approaches.

The long-term training approach is introduced in Varela (1996) where the idea of neurophenomenology was originally advanced. According to Varela, there are three basic steps in phenomenological description (Varela, 1996, pp. 336-337). The first step is to suspend what is often called the "natural attitude" (Husserl 1931) – that is, the background state of taking it for granted that the real objects exist in itself prior to our conscious experience of it and the accompanying tendency to attend to things in the real world – and to reorient one's attention reflectively towards the experience of these objects. The second step is to develop an intimacy with conscious experience itself, a new field of inquiry opened up by the suspension of the natural attitude. The third step is to produce linguistic descriptions of the experience.

Following these steps is a highly skilled practice: It is not something anyone can do by just being provided with explicit instructions. Thus, Varela argues that phenomenological description is truly possible only for those who undergo "sustained training and steady learning" (Varela, 1996, p.

337). To collect reliable phenomenological data, therefore, we need experimental subjects who are already adept at phenomenological description thanks to their prior engagement with a long-term training in the practice. This long-term approach to neurophenomenology is actively pursued under the title of "contemplative neuroscience," in which the contemplative expertise of experienced meditation practitioners "plays an investigative role as central and indispensable as those of experimental observation and mathematical analysis" (Thompson, 2014, p. 78)

The short-term training approach, in contrast, aims to develop phenomenological skills of naïve subjects within the short timeframe of a single lab visit. While promoting the long-term approach in his original article, Varela and his colleagues have also conducted neurophenomenological experiments based on this short-term approach. Lutz, Lachaux, Martinerie, and Varela (2002), for example, collected descriptions of varying features of the noetic component (Section 2) of the subjects' experience by running a short training session on them who were not experienced practitioners of any form of phenomenology. This approach has the potential of vastly increasing the feasibility of neurophenomenological experiments as they can now be conducted without enlisting expert phenomenologists. In this regard, however, it is unfortunate that the training procedures have not been described in enough detail for others to know exactly how to carry out the training. It is probably no accident, we therefore think, that the short-term training approach is not as popular as the long-term training approach in recent studies.

2.2 The Non-training Approaches

Let us come back to the taxonomy (Figure 1). The third node ("Conversation") separates those approaches that do not involve phenomenological training into two classes: the *phenomenological interview approach* and the *questionnaire approach*.

In the phenomenological interview approach, experimenters collect phenomenological data by conducting interviews on their experimental subjects. Phenomenological interview methods are

proposed in various forms in the literature (Høffding & Martiny, 2016; Hurlburt & Akhter, 2006; Olivares, Vargas, Fuentes, Martínez-Pernía, & Canales-Johnson, 2015; Petitmengin, 2006). In general, they have a common strength and weakness compared to the training approaches: The strength is that it reduces the amount of cognitive burden imposed on the subjects, who can then spend more cognitive effort to the act of description itself; the weakness is that the experimenters must undergo considerable training to acquire appropriate interview skills. Despite this practical difficulty, the interview approach is arguably more popular than the training approaches in recent neurophenomenology and phenomenologically-oriented psychological studies (Brouwers et al., 2018; Depraz, 2018; Valenzuela Moguillansky, O'Regan, & Petitmengin, 2013).

In contrast, the phenomenological questionnaire approach uses psychological questionnaires to resolve the problem of phenomenological data collection (Pekala, 1991). We can think of this as a pre-fixed form of phenomenological interview: they are both ways of prompting phenomenological descriptions by asking questions. The questionnaire approach has two major advantages: (i) It generates phenomenological data in the form of standardized responses, which are more easier to analyse than the qualitative data generated in the other approaches; (ii) No special skill beyond what is taught in a standard psychology class is required for the experimenter to use phenomenological questionnaires. A major disadvantage, on the other hand, concerns the difficulty of creating a valid phenomenological questionnaire: Arguably, they can only be created by using phenomenological data already collected through the other three approaches. In recent consciousness research, phenomenological questionnaires are mostly employed to investigate *altered states of consciousness*, such as impaired self-awareness in traumatic brain injury (Hart, Sherer, Whyte, Polansky, & Novack, 2004), altered self-experience in psychedelic states (Millière, 2017; Millière et al., 2018), hallucinations in Parkinson's deasease patients (Papapetropoulos et al., 2008), and the experience of isolated sleep paralysis (Solomonova et al., 2008).

This concludes our brief review of the landscape of methodological approaches to the problem of phenomenological data collection. It is not meant to be exhaustive, but we hope it is comprehensive

enough to deliver an overall sense of the current state of art. Importantly, it indicates how the short-term training approach is surprisingly underdeveloped despite its potential for making neurophenomenology much more accessible than it currently is.[3] In the following, we discuss our attempt to unlock this potential by developing a short-term phenomenological training program.

3. The two-stage short-term phenomenological training program

Our short-term phenomenological training program was designed to develop two skills central to the practice of phenomenological description. One is the skill to suspend one's "natural attitude" (Section 2.1) and reorient one's attention towards what we call the *non-objectual aspects* of conscious experience. The other is the skill to carefully describe these non-objectual aspects.

By *non-objectual aspects*, we mean features of conscious experience that cannot be attributed to the intentional object of the experience. This includes (i) the ways in which the object appears in experience and (ii) the ways in which one is conscious of the object. The distinction is modelled on a tripartite analysis of consciousness, famously advanced by Edmund Husserl, in which these two aspects are each known as *noematic contents* and *noetic acts* (e.g., Husserl, 1999, p. 36). When you see a round plate, for example, the noematic content (or the way in which the plate appears in experience) varies as you move around it, but the plate itself does not change its objective properties. The noetic act (or the way in which you are conscious of the plate) is partly constant and partly variable: It is constant in that you are invariably aware of the same object through visual perception,

[3] Recently, Lutz and his collaborators have advanced a training protocol that intends to develop a naïve participant's ability to describe the subjective features of meditations states (Abdoun et al. 2019). This may be seen as an advance in the short-term training approach to neurophenomenology. Their protocol, however, has different aspirations from our short-term training program in a few respects: (i) It aims to develop the relevant phenomenological skills in two days, while we aim to achieve some development within the timeframe of a single visit to the lab; (ii) It focuses on developing "a basic understanding of a few selected phenomenological dimensions" (Abdoun et al. 2019, p. 61) specifically relevant to meditation experience; (iii) It is applied to the participants by qualified instructors with considerable teaching experience rather than the experimenters themselves.

but variable in that you are aware of the plate with more or less clarity depending on the perspective on it.

The training program consists of two stages of training, which we call the *illusion training* and the *guidance training*: The first stage aims to develop the participant's ability to attend to the non-objectual aspects of his or her experience; the second stage aims to hone this same attentional ability and also cultivate the descriptive ability for putting the non-objecutal aspects accurately into words. The rest of this section presents these two training stages in more detail.

3.1 Stage 1: Illusion Training

In the *illusion training*, the participants are instructed to attempt a phenomenological description of the experience of seeing illusory figures. More specifically, after receiving a brief explanation of the distinction between objectual and non-objectual aspects of conscious experience, they are requested to describe (i) the ways in which the object appeared to them, (ii) the ways in which they were conscious of the object, and (iii) any other feelings involved in the experience. The first two descriptive categories each correspond to noematic and noetic features of the experience, while the third category is added to allow the participants to include in the description any experiential features that they do not recognize as clearly fitting into the other two categories.

The aim of this training is to help the participants have an intuitive grasp of the non-objectual aspects of conscious experience and develop the ability to keep their attention oriented to them. Illusory experiences were expected to be useful for this purpose because the difference between the object of experience (or what the experience is about) and the noematic content (or how the object appears) is more manifest in them than in non-illusory experiences. In the current study, we used two types of bistable figures to induce the illusory experience: the famous Necker cube and a less known witch-man figure (**Figure 2A**).

Successful phenomenological descriptions of the illusory experience will refer to various aspects of the experience, including objectual features (the object of experience), noematic features (how it appears to one), noetic features (how one is aware of it), and the correlative features (how the noetic act and the noematic content relate to each other). For example, we can expect an ideal description of the experience of seeing a Necker cube illusion to mention features such as:

- How the figure switches its appearance between two cubes (noematic feature);
- How the two cubes are oriented differently (noematic feature);
- How each cube appearance corresponds to different imaginative perspectives on the cube (noetic feature);
- How each appearance can be brought about by controlling the perspective through which one views the figure (correlative feature);
- How difficult it is nevertheless to keep one appearance constant over time (noetic feature), etc.

Likewise, we can expect an ideal description of the experience of seeing a witch-man figure to mention:

- How the figure switches its appearance between the two faces, the witch's and the man's (noematic feature);
- How the two faces exhibit different spatial dimensionality – the witch's face is represented two dimensionally, while the man's face represents an additional dimension of depth (noematic feature);
- How the two faces appear under different imaginative lighting conditions – the man's face summons up a non-real lighting from the left, while the witch's face indicates no non-real lightings (noematic feature);
- How one's gaze and attention scan the image during the viewing (noetic feature);
- How each appearance can be brought about by controlling one's attention (correlative feature);

- How the configuration of the image guides one's gaze and attention (correlative feature), etc.[4]

By effortfully attempting to describe these implicit aspects of their illusory experience, we expected the participants to improve their general capacity to attend to the non-objectual aspects even beyond the realm of illusory visual experience.

3.2 Stage 2: Guidance Training

The *guidance training* aims to improve the participants' ability to address the non-objectual aspects, including the ability to verbally articulate them, by providing them with individualised feedbacks and guidance. They first receive evaluative feedbacks about their initial description of their illusory experience produced in the illusion training. The trainer indicates how each element of their description managed to address objectual or non-objecutal aspects of the experience. After that, they are provided with an individualized guidance for improving their description of the non-objectual aspects, based on which they are instructed once again to produce a description of the same experience. Finally, they receive another round of evaluative feedbacks in regard to this newly produced description.

The guidance consists primarily of questions, which prompt the participant to attempt to articulate the relevant aspect of their experience. For example, the questions used in relation to the experience of seeing the Necker cube included the following:

- How many cubes did you see?
- What are the differences between the two cube appearances?

[4] The descriptions of Necker cube illusion are based on those presented by the French phenomenologist Maurice Merleau-Ponty (2012, pp. 273-276) and the American phenomenologist Don Ihde (2012, p. 65f.). Descriptions for the witch-man figure were produced and corroborated intersubjectively among the authors. Since the witch-man figure is not discussed in existing phenomenological literature, we could not check them against other expert or classical phenomenologists.

- Can you control the appearance at your will?
- Can you try to see the figure as a 2D pattern?
- What did you do when you tried to do this?
- How does it feel when you try to do this?

Likewise, the questions used in relation to the experience of seeing the witch-man figure included the following:

- How many things did you see?
- What are the differences between the different appearances?
- Can you control the appearance at your will?
- Can you try to see the figure as not representing anything?
- What did you do when you tried to do this?
- How does it feel when you try to do this?

Each participant receives different guiding questions depending on the content of their initial description. The first questions in the above lists, for example, will not be asked to someone who has already mentioned the alternation between *two* cube or face appearances. On the other hand, those who did not even mention this in their first attempt are not supposed to be presented with the last few questions before being guided through the experience with the first few ones.

4. Experiment 1

4.1 Material and methods

To test the effectiveness of the two-stage short-term training program, we conducted a psychological experiment that compares the quality of phenomenological descriptions produced before, between, and after the illusion and guidance trainings. Assuming the effectiveness of the training program, we

expected that the subjects would become better at addressing the non-objectual aspects of the experience in their description after each training stage.

4.1.1 Participants

13 healthy participants (age 21–24, mean = 22.7; 6 females) were recruited from the subject pool at Osaka University. They had normal or corrected-to-normal vision. None of them had prior exposure to the philosophical tradition of Husserlian phenomenology. They were randomly allocated to the experimental group (10 participants) and the control group (3 participants). Informed consent was obtained from all the participants prior to the experiment. The experiment was conducted at the National Institute of Information and Communications Technology (NICT). The experimental protocol was approved by the ethics and safety committees of NICT.

4.1.2 Stimuli

We used two bistable figures, the Necker cube and the witch-man figure (**Figure 2A**), for training stimuli; two figures that closely resemble them yet do not induce bistable perception for false-training stimuli (**Figure 2B**). The false training was conducted on the control group to control the potential training effect of repetition. For test stimuli, we used one 2D image and two 3D objects: an illustration of a smiling face, a branch, and a glass (**Figure 2C**). All three stimuli were used for all three test phases of the experiment. We kept from using illusory images as test stimuli and instead chose these non-illusory stimuli, which are unlikely to induce visual illusions, since we aimed to train phenomenological skills with some general applicability—that is, the ability to better describe different kinds of experience from the one used in the training.

4.1.3 Task procedure

The experiment consisted of three test phases and two training phases (**Figure 2D**).

In the test phases, the participants were instructed to attempt a phenomenological description of the experience of seeing the test stimuli by paying special attention to (i) the ways in which the object appeared to them, (ii) the ways in which they were conscious of the object, and (iii) any other feelings involved in the experience. The description session lasted up to 10 minutes (pre-test) or 5 minutes (mid-test, post-test) for each experience. To encourage careful reflection upon the experience, the participants were allowed to start the verbal report only after the first minute of each session. We also instructed that they are free to stop the report and quietly reflect upon the experience during the session. They were also free to end the session before spending full time if they felt they had nothing more to describe about the experience. In the pre-test, a brief explanation of the non-objectual aspects of conscious experience was provided in the beginning. In the mid-test and the post-test, the participants were instructed to give priority to novel descriptive contents over what has already been reported in the earlier tests.

In the illusion training, the participants were instructed to describe the experience of seeing bistable figures focusing on its non-objectual aspects (Section 3.1). The control group was instructed to do the same in regard to the experience of seeing non-bistable figures that closely resembled the bistable figures presented to the experimental group (**Figure 2B**). The description session lasted up to 15 minutes for each stimulus, but the participants were only allowed to start reporting after the first minute of the session to encourage careful reflection. They were also free to intermit or end their description before full time.

In the guidance training, the participants received both positive and negative feedbacks on the quality of the description they produced during the illusion training; then they were provided with an individualized guidance for improving their description (Section 3.2). The control group was provided

with a false feedback and a false guidance: We simply rehearsed the descriptions they produced during the illusion training and then instructed the subject to confirm the content of those descriptions.

4.1.4 Data analysis

Data analysis was conducted in the following steps. The first step is data preparation: Verbal reports from the test phases were transcribed based on video- and audio-recordings of the description sessions and incomplete transcriptions produced during the session in real time; then the transcriptions were parsed into meaningful units, which would become the direct object of analysis.

The second step is data analysis. Each unit was given a label that indicates the nature of its content according to the following steps (**Figure 3**): (i) Decide whether the unit addresses the *current experience* of viewing the object or *something else*; (ii-a) When it concerns the current experience, determine whether the unit reports on *objectual* or *non-objectual features* of the experience; (ii-b) When it concerns something other than the current experience, determine whether the unit reports on *associations* or offers *speculative explanations* of the experience; (iii-a) When it reports on objectual features, determine if it identifies the *object of experience* or describes *features of the object*; (iii-b) When it reports on non-objectual features of the experience, determine whether the unit addresses features of the way the object appears to one (*noematic features*), features of the way one is aware of the object (*noetic feature*), features of the way in which these two aspects affect each other (*correlative features*), or *other non-objectual features* that do not squarely fit into these categories; (iii-c) When it reports on associations, determine whether it is about an *associated thought*, *memory*, *imagination*, or *emotion*; (iii-d) When it offers a speculative explanation, determine if it is a *speculative sub-personal account* or a *speculative generalization*.

The third step is data evaluation. The effect of the training program was evaluated by comparing the descriptions produced before and after each training. There were three basic evaluation criteria: (i) Whether the description has become more focused on the present experience as a result of

the training; (ii) Whether the description after the training has come to address non-objectual aspects that were not addressed before the training; (iii) Whether the description after the training has come to address non-objectual aspects that were already addressed before the training in more depth. Based on these criteria, each participant was evaluated either as *effectively trained*, exhibiting *limited training effect*, or exhibiting *no justifiable effect*.

4.2 Results

Some form of improvement in the ability to describe the non-objectual aspects of conscious experience was observed in eight of the ten training participants (**Table 1A**). Five participants (#2, #5, #7, #8, #10) exhibited improvement both in their ability to describe non-objectual features of *pictorial perception* (or the experience of seeing 2D images) and *object perception* (or the experience of seeing 3D objects); all of them somewhat improved their descriptive skills after the illusion training, and further honed their skills after the guidance training. Two participants (#4, #6) showed improvement only in regard to pictorial perception; one of them (#6) already exhibited some improvement after the first stage, the illusion training. One participant (#9) showed improvement only in the mid-test taken after the first stage of the training program. Two participants (#1, #3) left no evidence of improvement in their test results. In comparison, no participants in the control group exhibited evidence of improvement (**Table 1B**).

4.2.1 An example of an effectively trained participant

One participant for whom the training program proved effective (#10), for example, made the following report in the pre-test regarding the experience of seeing a branch:

> *Pre-test description.* I noticed that the color of the whole branch is different just like there is a front and a back, and that it gets thinner towards the end, making a Y-shape at the tip. I

> thought that perhaps branches on the street I always use have different parts by looking carefully, I see them without thinking much, but maybe I really just see them for a moment. [5]

The first sentence only describes features of the branch as opposed to non-objectual features of the experience. The second sentence offers a general claim about experiences of the same type as opposed to describing the current particular experience of seeing the branch. These indicate that the participant was neither able to focus on one's present experience here and now, nor to reorient one's attention from the object of the experience to the experience as such. After taking the illusion training, however, the same participant offered the following description in the mid-test.

> *Mid-test description*. Before, I was seeing the branch from above since I intended to see its shape, but I'm thinking now what it would look like if I see it from the right, what if I change the way I see it. I'm starting to think that maybe this part of the end [of the branch] changes its color or that there will be more of these bumpy stuffs.

In this description, the participant is still focused more on the features of the branch itself ("its color" "bumpy stuffs") as opposed to the non-objectual aspects of the experience. However, s/he also starts to attend to features of the way s/he is aware of the object (*noetic features*) and explore how it correlates with the noematic content ("what it would look like […] if I change the way I see it"). This suggests that the first stage of the training already had some training effects albeit to a limited extent.

Then after the second, guidance stage of the training, the same participant offered the following description in the post-test:

> *Post-test description.* When I lift the closer end, the way I see it changes, and as I put more focus on the closer, thin end, it looks like stretching toward me, and if I shift my gaze to the thicker end, […] the feeling of its sticking towards me decreases. […] If I gaze at the closer

[5] The original description was produced in Japanese and translated into English by [the corresponding author]. The same applies for all the following descriptions.

> parts, I can't see the distant parts, and on the other hand, if I gaze at the branch at the distant end, because the thick end is bent, I become unable to see how bent it is.

This passage suggests improvement in the participant's phenomenological skill in several respects: First, the description is consistently focused on the current experience of seeing the branch, which was not obviously the case in the previous descriptions. Second, it reports on features of the way in which the object appears in the experience (*noematic features*), which are not directly attributed to the object itself ("it looks like stretching toward me," "unable to see how bent it is"). Third, it discusses how the noematic content (how the branch appears) depends on the noetic act (how one is aware of the branch) ("if I shift my gaze …"). By comparing the three reports, thus, we concluded that the two-stage training program was effective for this participant. Furthermore, it has been noticed that the illusion training was already somewhat effective in itself without being followed by the second stage of guidance training.

4.2.2 An example of a participant exhibiting no justifiable training effect

Compare this successful example with descriptions offered by another participant for whom the training program was ineffective (#1). Before taking any training, this subject only uttered the following to describe the experience of seeing a glass:

> *Pre-test description.* I did not know what to do as I have never gazed at a glass in my life so far. I thought I shall see the features of the glass, and I was gazing at the glass paying attention to its features: the weight, the thickness, and so on of the glass itself.

Given the poverty of the initial description, one might think it would be easy for this participant to improve the description after taking the training, even if this did not make her/him an excellent phenomenologist. Even after undergoing the two stages of training, however, s/he only managed to provide the following two-sentence description regarding the same experience:

Post-test description. It's pretty heavy, so it won't fall by putting a flower in it, and as its top is wide open, you can easily put a flower in it as a vase. If it's a glass, it looks like an easy glass to drink from because of its wide opening.

Certainly, the description has almost doubled in length. However, this is not because the participant has become more attentive to the non-objectual aspects of the experience. Rather, the post-test description is longer only because it reports on associated thoughts about the presented object. Accordingly, we concluded these descriptive data as indicating the ineffectiveness of the training program for this participant.

4.2.3 An example of a participant exhibiting limited training effect

The training program was more effective in regard to pictorial perception (or the experience of seeing a 2D image) compared to object perception (or the experience of seeing a 3D object). This was indicated from the fact that two participants, for whom the training program was not entirely effective, still improved their phenomenological skill regarding pictorial perception. For example, one participant (#4) provided the following descriptions about seeing an illustration of a smiling face:

Pre-test description. What I thought by seeing it was that it resembles those stamps used in LINE [a chat app widely used in Japan] and other SNS. Also, my eyes were drawn to the smeared or blurred parts of the edge of the print. Also, there are thick and faint lines in the bottom right, and my eyes were drawn to the fact that the print is somewhat uneven.

Post-test description. It constantly looks to be a smiling face, but if you keep looking at it, it starts to feel like an evil smile. As I learned from the earlier image that you don't see the whole when you focus on any one point, I directed my gaze at one of the ellipses which looks like an eye. But I gradually became less focused and started to see the whole vaguely, and then […] the picture of the smiley mark looked like three pictures, and I thought that it can also look like a picture whose central parts pop out towards me […]

The pre-test description here contains three types of descriptive contents: *features of the object* ("thick and faint lines"); *noetic features* of the experience ("my eyes were drawn"); *associative thoughts* ("it resembles those stamps"). In contrast, the post-test description reports on the *correlative features* of the experience by noting that how one sees the object ("became less focused," "see the whole vaguely") affect its appearance to one ("looked like three pictures," "looked like a picture whose central parts …"). The same participant's post-test descriptions concerning 3D object perception, however, exhibited no such change. Compare the following two descriptions of the experience of seeing a glass each obtained in the pre-test and the post-test:

> *Pre-test description*. First of all, I think by seeing its shape that the glass is probably for drinking beer. Then I wondered if it is heat resistant glass. Otherwise I was concerned about the stain because I use to be in food industry.
>
> *Post-test description*. What I felt by seeing now is, since there is a bump around the top: what meaning does this have? I was wondering that it might have the function of keeping drinks from drooping down, as this often happens, and whether this bump is formed due to a problem with the manufacturing process. […]

Both descriptions report primarily on associated ideas rather than the present experience of seeing the glass ("I wondered if it is heat resistant glass", "I was wondering that it might have the function of keeping drinks from drooping down"). Despite the indication of positive training effect with respect to the experience of seeing 2D images, it seems that this participant remained unable to reorient one's attention to the non-objectual features of the experience of seeing 3D objects.

4.3 Discussion

Experiment 1 tested the effectiveness of the two-stage phenomenological training program, consisting of illusion training and guidance training. Eight of the ten participants who received the training

showed somewhat positive responses to the training: Five produced improved phenomenological descriptions after the training both when presented with a 2D image and a 3D object; two indicated improvement only with respect to the experience of seeing a 2D image; one exhibited improvement only after the illusion training. Two participants left no indication of improvement after the training. In short, it has been demonstrated that the two-stage training program is significantly effective in developing phenomenological skills in naïve participants. At the same time, a considerable degree of *individual difference* was observed in each participant's response to the same training program.

These results diffuse the in-principle worry that it must be impossible to develop a specialized skill of this kind in such a short frame of time. In our light, this is not particularly surprising since the training program did not aim to have naïve participants master the art of phenomenological description, but only aimed to induce some degree of development in their phenomenological competency. Given the current trend in neurophenomenology to draw on more 'expensive' methods of phenomenological data collection (Section 1), we believe that training programs of such limited effects are already beneficial for the future of first-person approaches to consciousness research in general and neurophenomenology in particular.

By attempting the two-stage program, it also became clear that the guidance training demands more skill and experience than expected, for the current scheme requires that the experimenter provide an adequate feedback to each participant without knowing what she will say in advance. This suggests that some form of special training would be required for anyone to conduct an experiment using our training program. But this goes against our original motivation to develop a short-term training program which was to make the phenomenological method readily accessible to researchers who are interested in exploring the subjective features of conscious experience, but not yet committed enough to go through burdensome trainings. An easy way out might be to remove the guidance stage from the program at all to make a one-stage program consisting only of the illusion training. In fact, it has been indicated that the illusion training alone can have some training effect on the participant: Seven participants (#2, #5, #6, #7, #8, #9, #10) showed some improvement in their mid-test

descriptions (**Table 1A**). To determine the prospect of this proposal, we conducted a second experiment to test whether a one-stage program of this kind will develop a naïve participant's phenomenological skill.

5. Experiment 2

The results of Experiment 1 indicated that the short-term training program will be easier to conduct without the guidance training and also that the illusion training was effective on its own. We designed Experiment 2 to reconfirm the hypothesis that phenomenological skills can be effectively developed through some form of illusion training alone.

5.1 Material and methods

5.1.1 Participants

18 healthy participants (age 19–35, mean = 22.4; 8 males, 10 females) were recruited from the subject pool at Osaka University. They had normal or corrected-to-normal vision. None of them had prior exposure to phenomenology as a philosophical tradition. Informed consent was obtained from all the participants prior to the experiment. The experiment was conducted at the National Institute of Information and Communications Technology (NICT). The experimental protocol was approved by the ethics and safety committees of NICT.

5.1.2 Stimuli

Two bistable figures, a Necker cube and a Rubin vase, were used as training stimuli (**Figure 4A**). Two two-dimensional figures were used as test stimuli: the "cracked egg" and the witch-man figure (**Figure 4B**). Both stimuli were used in both test phases before and after the training. We only tested the participants with 2D images: Experiment 1 indicated that the training was more effective with respect to pictorial perception, so we decided that it would be more efficient to leave out 3D objects to determine whether the modified illusion training has any training effect at all.

5.1.3 Task Procedure

The experiment consisted of three phases: the pre-training test (pre-test), the illusion training, and the post-training test (post-test) (**Figure 4**).

Just like Experiment 1, in the test phases, participants were instructed to attempt a phenomenological description of the experience of seeing two test stimuli by paying special attention to (i) the ways in which the object appeared to them, (ii) the ways in which they were conscious of the object, and (iii) any other feelings involved in the experience. For each stimulus, they had 10 minutes to reflect upon and describe the experience of seeing it. To encourage careful reflection, they were instructed to start reporting only after the first minute of the session. They were free to stop the report and quietly reflect upon the experience during the session, as well as end the session before spending full time if they felt they had nothing more to say.

In the pre-test, we provided a brief lecture on the phenomenological practice of describing the non-objectual aspects of one's experience. We have updated the content of the lecture from that provided in Experiment 1 to make it easier for the participants to grasp the idea. Most updates concerned minor choices of verbal expressions. The only major change that has been made was that we have added an analogy with the practice of analysing pictures and films to explain the idea of describing the ways in which objects appear in experience: On seeing a picture or a film, one can talk about objects and events depicted in them, but they can also attend to and describe the ways in which these things are being depicted, for example, in terms of composition, lightning, color contrast, etc.; the participants were instructed to attend to and describe the ways in which objects appear in their experience in a comparable manner.

In the training phase, the participants were instructed to describe the experience of seeing bistable figures focusing on its non-objectual aspects, just like in the illusion training phase of Experiment 1 (Section 4.1.3). The description session lasted up to 15 minutes for each stimulus, but the participants were only allowed to start reporting after the first minute of the session to encourage careful reflection. They were also free to intermit or end their description before full time. Since we

already confirmed in Experiment 1 that a control-group counterpart of the illusion training brings about no training effect (Section 4.2), we did not have a separate control group in Experiment 2.

5.1.4 Data Analysis

Data analysis took the same steps as Experiment 1 (Section 4.1.4). Since only 2D images were used in the test phases, however, participants were categorized as either *effectively trained* or exhibiting *no justifiable training effect*; the category *limited training effect* was not used in this experiment.

5.2 Results

The one-stage training program proved effective for five participants (#4, #7, #11, #15, #18). Two participants (#16, #17) seem to show no improvement primarily because they were relatively adept at attending to and describing the non-objectual aspects of their experience since before the training. Seven participants (#1, #2, #3, #5, #6, #9, #13) exhibited limited degrees of attentiveness to their experience both before and after the training, indicating no improvement in their ability through the training. Four participants (#8, #10, #12, #14) consistently failed to focus on the present perceptual experience which they have been asked to describe. (**Table 2** summarizes examples of pre-test and post-test descriptions produced by each participant)

5.2.1 An example of an effectively trained participant

One participant (#7), for whom the one-stage training program proved effective, started like many others by primarily reporting what one is seeing and thoughts associated to the perceptual experience in question. For example:

> *Pre-test description* ("Cracked egg"). As for how it appears, this part looks like wave, it was first in this orientation, but it rather looks in this orientation; the bottom half is water, and I imagined it to be like a sea. And after this looked like a wave and a sea, I thought it resembles one of the LINE stamps I use frequently.

The first sentence in this passage describes that the presented figure has been seen as a wave or a body of water (*object of experience*), while briefly touching on how it appears to be oriented in one way or another (*noematic feature*). The second sentence reports on an *associated thought* rather than the experience of viewing itself. After the training, the same participant becomes more focused on the perceptual experience at issue, and the noematic description becomes more elaborate. For example:

> *Post-test description* ("Cracked egg"). It again began the same as before, this side is water and this side sky; it looks like a sea. I thought to think of a different way of seeing it; the upper side can be sea, so I try to think that way, and then it's like a different beach. Earlier it was like a swimming wave, the upper half was like sky or the background, but I think of the upper as sea, I felt that the lower side looks like a beach.

The first sentence reports that one side of the figure has been seen as an image of the sky and a body of water (*object of experience*). Rather than just saying that it appeared in one orientation or another as in the pre-test description, the rest of this passage articulates the difference between the *noematic features* of the two appearances by describing one in terms of wave and sky and the other in terms of beach and sea. The participant is also much more focused on describing the current experience. We therefore concluded that this participant has improved her/his phenomenological skills to attend to and describe one's experience through the training program.

5.2.2 An example of a participant with no justifiable training effects

Many participants kept describing features of the stimulus both before and after the training, which indicates their failure to re-direct their attention to the experience itself, or more precisely, to the non-objectual aspects of their experience. Here is an example from one participant (#6):

> *Pre-test description* ("Cracked egg"). It looked like a figure of a circle with a wavy line in it. It's a front-loading washing machine, and it looked like it's running. The wave is not constant; it's bumpy and pointed […]

> *Post-test description* (“Cracked egg”). “There is a circle drawn on the paper, and there’s a wavy line in it. The circle is not elliptical but a neat circle […]

Both descriptions only mention the object of the experience (“circle with a wavy line”) or its features (“bumpy and pointed”, “neat circle”). Many other participants followed this pattern, and we judged that the training was ineffective for such cases.

But this was not the only way to fail in producing phenomenological descriptions. Other participants seemed to find it difficult to focus on the experience or even the object presented here and now. One participant (#14) made the following descriptions, for example:

> *Pre-test description* (“Cracked egg”). What I first thought on seeing it is that I imagined an egg. I really like soft boiled eggs, and they crack like this when you crack them, so that immediately occurred to me. This shape like a crack made me imagine, though intuitively, brain waves, peaks of heart sounds, and things like that. […]
>
> *Post-test description* (“Cracked egg”). Honestly again what occurred to me is those cracks in eggs. People have fixed ideas, so once it looks that way it only looks so. […] And this didn’t happen earlier, but I’m starting to see it as a *takoyaki* [Japanese ball-shaped snacks] […] I was born and have lived in Osaka all my life for 24 years, so close to Osaka, and I think this is why I made an association with the Osaka speciality *takoyaki*.

Although the instruction was to describe the experience of seeing the figure, this participant mostly reports on associations (“brain waves”, “*takoyaki*”) and attempts to explain them without referring to the present experience here and now (“I really like soft boiled eggs”, “I have lived in Osaka all my life”). Some other participants also failed to focus on the present experience of seeing the stimulus, and we judged that the training was ineffective in all such cases.

5.2.3 An example of a participant already competent before the training

Some participants indicated a considerable level of competence in phenomenological description before receiving the illusion training. Here is an example from one such participant (#16):

> *Pre-test description* (“Cracked egg”). There is a wavy line which looks like mountains when you lay to the side and difficult to describe when you stand it up. […] As to my gaze and attention, it was first directed to the whole, and then I wondered what the figure is, and finally I came to see the parts carefully rather than seeing the whole. [...]

The first sentence of this passage reports on the *object of experience* (“wavy line”) and its *noematic features* (“looks like mountains”, “difficult to describe when you stand it up”). The second sentence presents a close observation of a *noetic feature* of the experience (“it was first …, then …, and finally …”). This suggests that this participant was already quite able to attend to the non-objectual aspects of the experience before taking the training. Compare this with an excerpt from the post-test description from the same participant:

> *Post-test description* (“Cracked egg”). On first sight, a circle and a wavy line. […] When you turn it sideways, it's like a wave, there is sea and sky, I felt a non-homogenous, irregular realistic wave. I did not have the image of a wave so much earlier. I had a stronger impression of the moon or the sun earlier, but by changing its direction and looking closely at it, I thought it's easier to explain in terms of waves. [...]

It basically covers the same grounds as the pre-test description: it reports on the *object of experience* (“a circle and a wavy line”), *noematic features* of its appearance (“non-homogenous, irregular realistic wave”), and *noetic features* of one’s awareness (“changing its direction and looking closely”). We therefore concluded that this participant did not improve the ability to describe one’s experience as a result of taking the one-stage training program.

5.3 Discussion

Experiment 2 tested the effectiveness of the one-stage phenomenological training program, consisting of illusion training alone. In contrast to what has been suggested in Experiment 1, only five out of the 18 participants improved their phenomenological skill after taking the training. The other 13 participants showed no positive response to the training: 11 of them failed to attend to and describe the subjective features of their experience before the training; two were somewhat able to do so without the training; none of them showed any sign of improving their phenomenological competence through the training program. It is unclear why the results were not as positive as they were in Experiment 1. Given the small sample size, however, it is hard to draw any general conclusion about the prospect of illusion training from these experiments. Having said that, the current result suggests that a more active intervention in the learning process than just letting the participants practice the art with respect to visual illusions may be useful to develop an effective training program (section 6.3).

It is also worth noting that, once again, considerable *individual difference* was found in the participants' ability to produce phenomenological descriptions. This time, the difference was not so much about the response to the training program, but rather two interesting areas of difference emerged. One is that a small group of participants were already fairly adept at phenomenological description before taking the training. Another has to do with different patterns of failure: some participants failed not only to provide careful descriptions of the experience, but to focus on the experience at issue in the first place.

6. General discussion

These findings indicate several important lessons regarding the methodological project of developing a short-term phenomenological training program. In the following, we consider the implications of the results for this methodological project organized around three issues: (i) individual difference; (ii) transferability of phenomenological skills from one domain of experience to another; (iii) active interventions in the learning process.

6.1 Individual difference in phenomenological aptitude

Both experiments confirmed a considerable degree of *individual difference* related to the ability to produce phenomenological descriptions. Some people are more apt for phenomenological description, which can be a matter of innate and/or acquired quality. This suggests that short-term training approaches will benefit from investigating the nature of what might be called *phenomenological aptitude*: What kinds of qualities are associated with that of being apt to engage in phenomenological description? How do they make some people better than others at attending to and articulating features of their experience?

There are studies demonstrating that observational drawing skill is supported by perceptual capacities to attend to local features of an object, those to attend to global features of an object, and those to switch flexibly between these perceptual modes (Chamberlain & Wagemans, 2015). Intuitively, observational drawing and phenomenological description are similar in that they both require that one carefully explore the ways in which the object appears to oneself. Hence, it is possible that those attentional capacities that support observational drawing are beneficial in learning how to produce phenomenological descriptions. There are a few other psychological factors which we speculate might be relevant: for example, linguistic capacities for articulating the observed features of experience, which may in fact also affect the quality of the observation itself; the ability to engage patiently with a overwhelmingly difficult task; intellectual open-mindedness and curiosity towards unfamiliar ways of thinking. In any case, the task of determining which individual qualities make up phenomenological aptitudes demand further empirical research. Once those individual factors that make the relevant individual differences are identified, researchers will be in a better position to develop effective training programs.

In addition, individual differences in the effectiveness of the same training program suggest the possibility of developing different programs for people with different levels of phenomenological aptitude. In developing a short-term training program, accordingly, it may be important to be clear

about the target population: that is, whether you are primarily trying to train participants with or without phenomenological aptitude.

6.2 Bounded transferability of phenomenological skills

The results of Experiment 1 indicate that phenomenological skills developed in regard to one domain of experience (e.g., pictorial perception of illusory figures) do not easily transfer to another domain (e.g., object perception) (Section 4.2.3). This suggests that phenomenological skills in real life tend to be more bound to specific domains of experience than one might expect from the common characterization of the phenomenological method as a general-purpose tool applicable to any type of conscious experience. This suggests that even if we worked out an effective training program, the exact scope of the phenomenological skills it develops, or their degree of transferability to other experiential types, would not be obvious in advance. In evaluating training programs, therefore, it is important to examine the scope of the ensuing phenomenological skills. This is not to deny the possibility of developing a universal phenomenological skill: that is, a general ability to effectively execute phenomenological analyses to any type of conscious experience. It seems, however, that this is an area where long-term trainings are necessary and that this goal lies far beyond the scope of short-term training programs.

6.3 Active intervention in the learning process

In Experiment 1, we confirmed that the two-stage training program was somewhat effective for the majority of participants. However, we also came to recognize that it is not ‘cheap’ enough to make it widely accessible for experimenters who are starting to consider exploring the subjective features of conscious experience. In Experiment 2, we tested a one-stage training program consisting only of the illusion training, but then found that it had a smaller training effect. This suggest that we need

something that goes between the two proposed schemes: that is, a training program that is less demanding ('cheaper') than the two-stage program, but that intervenes more actively in the learning process than the one-stage program. Here we can sketch two strategies for tackling this task.

The first strategy is to start with the two-stage program and to manualize the feedback process. If we can formulate the steps for providing effective feedbacks in terms of specific instructions, then the guidance stage will not be as inaccessible to researchers yet unfamiliar with the phenomenological method. Given the skill-demanding character of the feedback process, however, making a manual will not be an easy task; it is not even clear if it is a possible feat at all. Furthermore, in order to develop a manual, a careful study of the art of giving feedbacks is necessary, and much more data and insight about the feedback process is needed to conduct such study. Somewhat paradoxically, accordingly, the first step towards accomplishing the manualization would be to start attempting short-term phenomenological trainings involving the feedback process without relying on any such manuals. Although theoretically possible, we do not find much hope in pursuing this path of inquiry.

The second strategy is to improve the one-stage program by building some form of active intervention in the learning process into it. One possibility is to incorporate a demonstration of phenomenological description in the training program. For instance, instead of letting the participants attempt to describe the experience of seeing a Rubin vase right after offering a lecture about the idea of phenomenological description, as we did in Experiment 2, we can show them how an experienced phenomenologist might approach the task. It may be even more effective if the demonstration adopted a "Socratic method" so to speak: that is, if it consisted of questions that would prompt the participants to attend to their experience in a phenomenological manner. Such demonstrations would be useful as they can provide the participants with a concrete idea of what kind of description they are supposed to produce. In other words, it fulfils a similar function as the feedback process in the guidance stage of the two-stage training program. At the same time, it is preferable to the feedback process because it is much less demanding for the experimenters: we can even think of recording the lecture and

demonstration on film so that anyone can use the clip without going through any special training for learning how to use the training program.

It may also be useful to include more pre-emptive measures against common errors in the training program. Many participants failed to deliver adequate descriptions by reporting on things other than their present experience: for example, by describing mental associations and meta-cognitive processes, by advancing general hypotheses about certain types of experience, or by presenting speculative explanations about the underlying cause of their experience. To some extent, it seems possible to prevent such errors by stating explicitly and concretely in advance that these are not the kinds of things on which they are expected to focus.

7. Conclusion

We have discussed methodological lessons from our attempt to develop a short-term phenomenological training program. In Experiment 1, we tested the effectivity of the *two-stage phenomenological training program*, which aims to develop phenomenological skills for orienting one's attention towards and describing the *non-objectual aspects* of conscious experience, through two stages of training called the *illusion training* and the *guidance training.* The program proved effective for most participants, but it turned out to be exceedingly skill-demanding ('expensive') for our purpose. In Experiment 2, we tested a more simplified *one-stage training program*, which only consists of the illusion training. This program was much 'cheaper' compared to the two-stage program, but it demonstrated a smaller training effect.

Based on these findings, we proposed some methodological lessons for the project of developing short-term training programs. First, individual differences in phenomenological aptitude constitute a topic that deserves further empirical research. Second, it is important in evaluating short-term training programs to consider the scope of the phenomenological skills to be developed through them. Third, and most importantly, an ideal short-term training program should be something that lies

between the two programs discussed: that is, something that is less skill-demanding ('cheaper') than the two-stage program, but that intervenes more actively in the learning process than the one-stage program.

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Figure 1: Taxonomy of methods for phenomenological data collection. Each approach to the problem of phenomenological data collection is represented as an outcome of making two methodological decisions. Only one piece of work representative of each approach is listed in the figure.

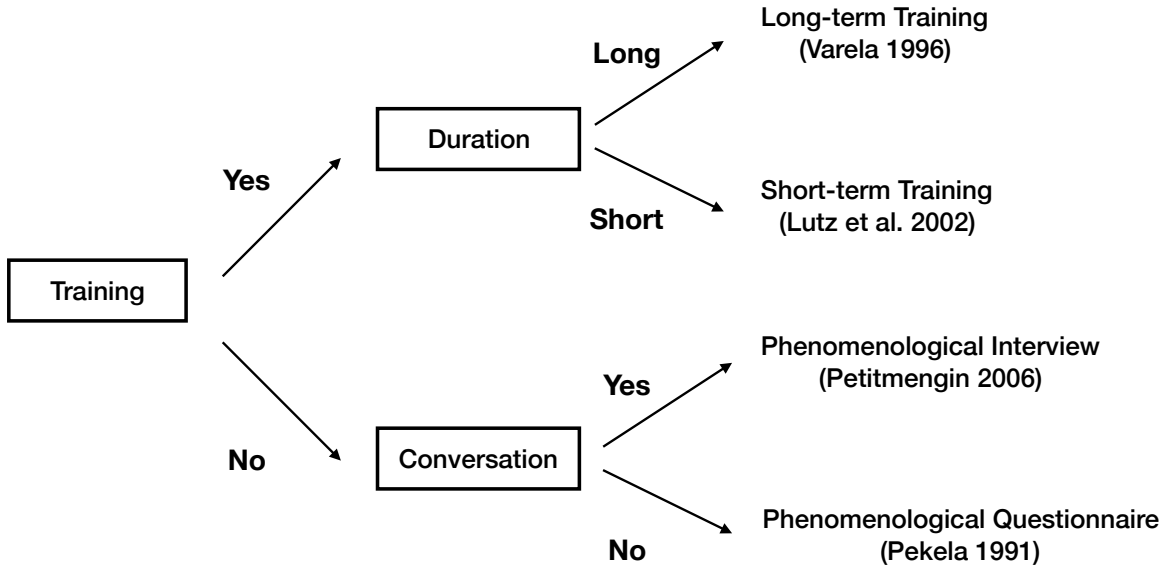


Figure 2: Experiment 1. Training stimuli, experiment stimuli and the experiment schedule. 2A: Illusory figures used in the illusion training. 2B: Non-illusory figures. Participants in the control group were instructed to describe the experience of seeing them during the first stage. 2C: Participants were instructed to describe the experience of seeing these stimuli in all three test phases of the experiment. 2D: The experiment schedule. In the training phases, the control group received fake trainings that superficially resembled the illusion and the guidance trainings.

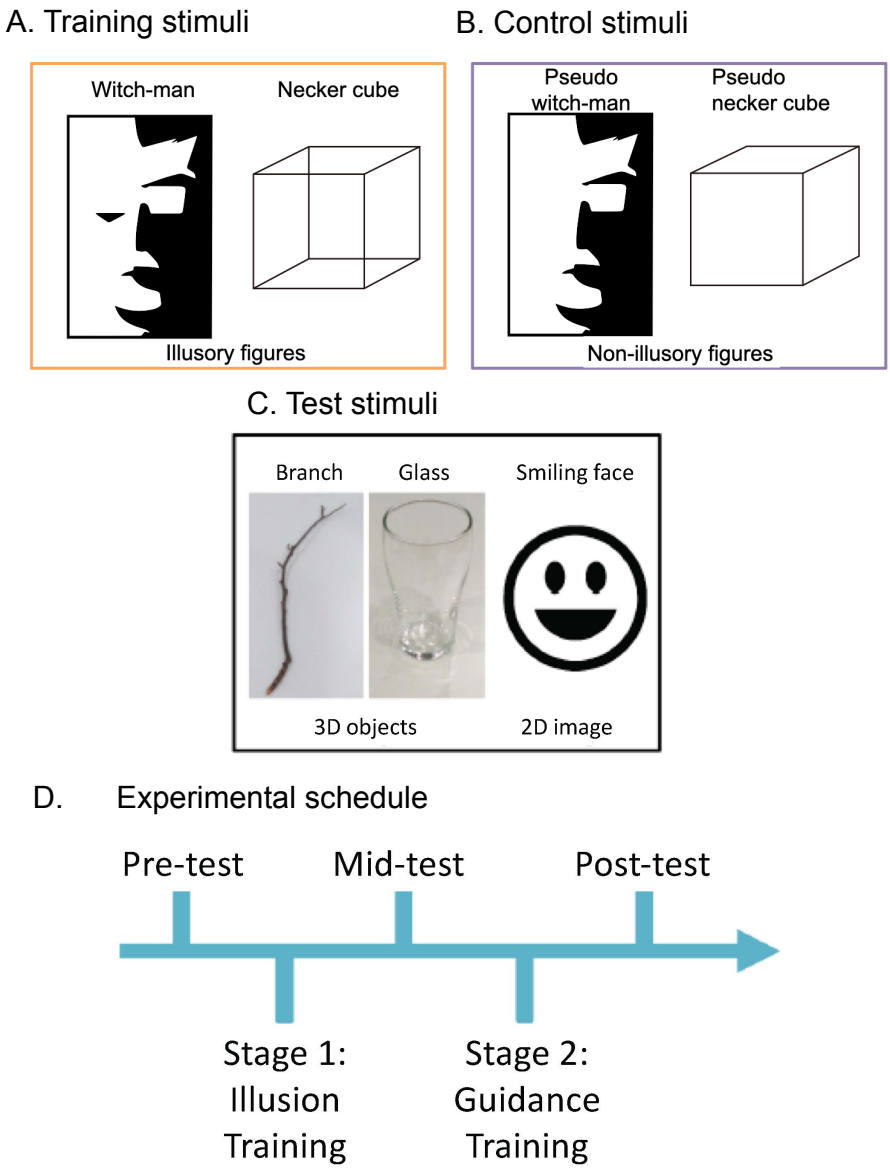


Figure 3: Labelling Process. Each meaningful unit of description was given a label according to the diagram below. *Object of experience*: Identifies what is being experienced; *Feature of the object*: Describes features of the experienced object; *Noematic feature*: Describe features of the appearance of the object; *Noetic feature*: Describe features of the ways in which one is aware of the object; *Correlative feature*: Describe how the appearance of the object and the way one is aware of it affect each other; *Others*: Describes non-objectual features of the experience that do not squarely fit in the other categories; *Associations*: Describe a *thought, memory, imagination,* or *emotion* induced by the perceptual experience of an object; *Sub-personal explanation*: Explain why one is having the current experience in reference to sub-personal processes; *Generalization*: Advance general claims based on current experience.

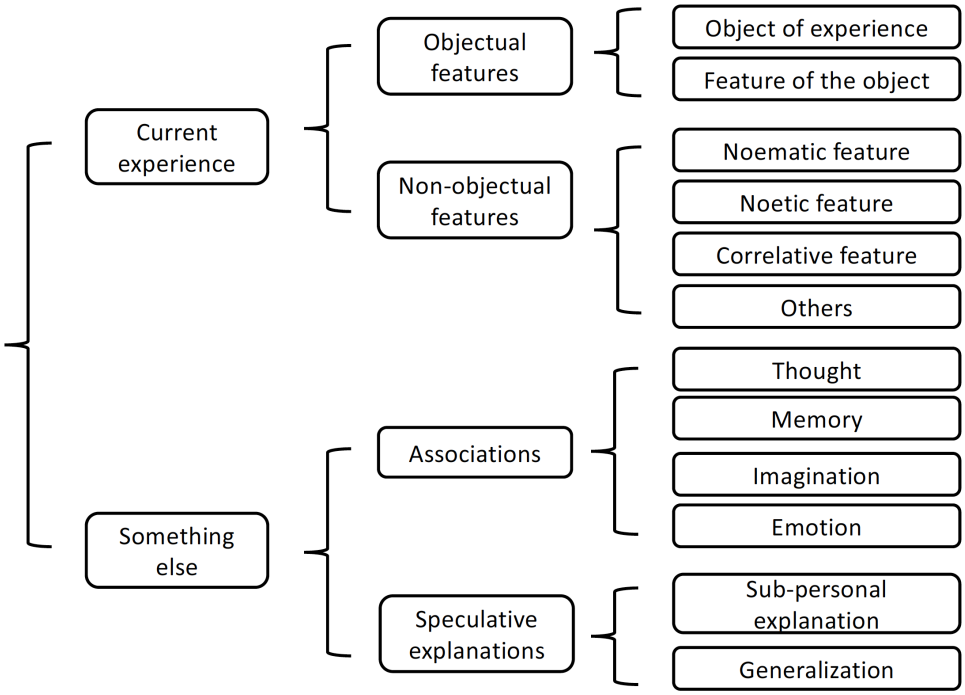
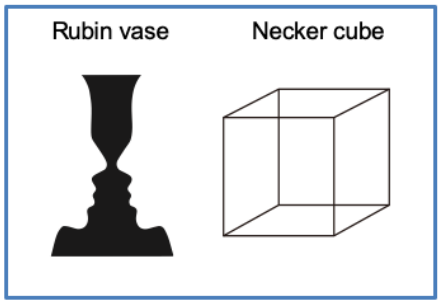
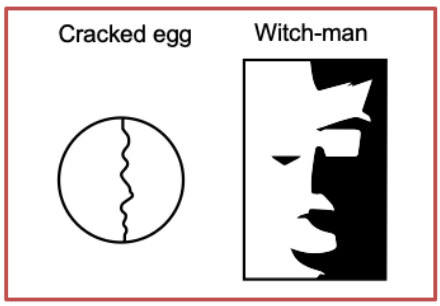


Figure 4: Experiment 2. Training stimuli, experiment stimuli and the experiment schedule. 3A: Illusory figures used in the illusion training. 3B: Participants were instructed to describe the experience of seeing these stimuli in the test phases of the experiment. 3C: The experiment schedule.

A. Training stimuli



B. Test stimuli



C. Experimental schedule