



Methodological reductionism or methodological dualism? In search of a middle ground

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Abstract

The contrasts between so-called objective and subjective measures of consciousness have been a dominating topic of discussion for decades. The debate has classically been dominated by two positions – that subjective measures may be completely or partially reduced to objective measures, and, alternatively that they must exist in parallel. I argue that many problems relate to subjective reports as they can be imprecise and vulnerable to a number of potential confounding factors. However, I also argue that despite the fact that subjective reports are fallible, all objective measures are derived from subjective measures, and, thus, will never under normal circumstances be more correct. I propose that the best and possibly only realistic way forward is a specific version of a “middle ground”: to attempt to improve subjective reports in a collaboration with objective research methods.

Keywords Consciousness · Subjective methods · Objective methods · Introspection · Methodology

1 Introduction

Historically, the attempt to “measure” consciousness has unfolded as a debate between direct and indirect approaches. Direct approaches are intuitively considered the most informative as participating experimental subjects here simply report about their own experiences. Subjective reports however have demonstrable limits, for which reason many scientists have refrained from their use and insisted on the use of objective measures only (e.g. Johansson et al., 2006; Nisbett & Wilson, 1977). The list of such limits is long, but typically involves lack of insights into personal bias, memory problems, and attention limitations.

In recent papers by Michael Pauen (Pauen & Haynes, 2021; Pauen, submitted), this classical debate about how to measure consciousness is re-initiated. Although

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this is far from the first time the debate reappears, it is still highly relevant as current empirical research on consciousness is carried out without a clear answer to these questions that are nevertheless fundamental to the research. Pauen presents a position that does not seek to deny the use of subjective reports, but suggests that objective methods over time could be developed to play a bigger role and – at least in some cases – replace subjective methods. Such a position may inspire a new and possibly fruitful debate if there can be a middle ground between classical positions.

Most discussions so far have however revolved around two proposals, although they come in many shapes. The first proposal, I will call “methodological reductionism”, meaning that subjective measures may (now or in the future) be replaced with objective measures. The second proposal, I will call “methodological dualism”, which is the view that subjective measures are in some way fundamentally different from objective measures, so that they cannot or only in part be replaced with objective measures. The two perspectives give rise to very different empirical research agendas and very different challenges. The challenge of the first proposal will be to first develop such measures and argue why they capture all instances of consciousness with respect to both exhaustiveness, exclusiveness, and granularity (Overgaard, 2015). The challenge of the second proposal will however be that the researcher must find ways in which the two “sets” of methods are optimally used in combination while at the same time explaining how the subjective measure of choice captures all instances of the relevant conscious content.

2 Replacing subjective measures

Pauen takes an optimistic stance regarding the possibility of partly replacing subjective reports with so-called third-person or “objective” methods. Rather than “condemning” direct subjective reports, however, he suggests that they can be replaced with better, “objective” or “indirect”, methods over time. Thus, Pauen does not set out to challenge subjective methods per se, but suggests, based on inspiration from the history of science that consciousness research should develop as an iterative bootstrapping process, which leads to a stepwise improvement of measurement techniques. This process is typically driven from one iteration to the next by measurement conflicts, which are resolved by inferences to the best explanation.

As a generic approach to any science, this would likely sound appealing to most. There is however some distance between a principal and generic approach and the practical possibilities and limitations within a research field. The consequence hereof is that even if one does not initiate this debate from a theoretical position anchored in e.g. physicalism or phenomenology, there will be advantages and problems directly related to the nature of the measurements themselves.

Experiments on consciousness that are based on objective measures – an “indirect” approach - have typically involved asking subjects to choose between alternatives, e.g. in forced-choice tasks (Lin & Murray, 2014). Although such methods may stay clear of classical limitations of subjective methods, they are confronted with other problems, which, according to some scientists, are greater. For one thing, objective measures must assume that the “threshold” of giving a correct response is

the same as the “threshold” of having a subjective experience of the same content (Fu et al., 2008; Timmermans & Cleeremans, 2015). Furthermore, in order to arrive at any one particular objective method, one must have “calibrated it” to something else in order to know that this particular behavior can be considered a measure of consciousness – and not something else. This would typically involve associating a subjective report with a particular behavior – a process by which one would “import” all the weaknesses related to subjective reports that one tried to avoid in the first place (Overgaard, 2010).

Essentially, if one wishes to study subjective experience, it is not at all clear which objective measure to use. How can we know, for instance, that any measure such as correct identification or any other measure of performance is actually about the subjective experience of interest – and more so than the subjective report (Overgaard, 2015)? It seems the only knowledge we could have comes from a prior correlation with introspective observation and report, and, accordingly, cannot have any higher precision than the introspective observation/report (Overgaard & Sandberg, 2021). In other words, in order to associate a particular behaviour or cognitive function with consciousness, one seems forced to base this decision on information from introspective reports – e.g., it derives from introspection only that we believe that working memory is closer related to consciousness than, say, activity in the appendix. That said, any argument for why subjective reports seem a *sine qua non* for consciousness research, is not an argument for any subjective reporting being precise or trustworthy. Regardless of one’s position on whether consciousness research needs to sometimes replace subjective methods with objective methods, the need to refine subjective methods seems an important endeavour.

In other words, the ambition to replace subjective measures with objective ones requires that one can demonstrate in practice how objective measures may be more precise than subjective measures while at the same time, the objective measures are mapped on subjective measures to begin with.

In recent years, the arsenal of indirect measures has been supplied with what is named “no-report paradigms”. Experiments of this kind attempt to first associate a particular objective measure (e.g. a behavior or a brain activation) with conscious experience, and then to apply this measure as a measure of consciousness so that no direct report is needed (e.g. Frässle et al., 2014; Pitts et al., 2014). Famously, Frässle et al. (2014) used the Optokinetic nystagmus—a physiologic phenomenon produced when asking a person to visually track a succession of moving stimuli. Other experiments have used other perceptual “read-outs” such as change in pupil size or perceptual switches. Basically, these experiments have been interpreted to argue that some basic perceptual phenomena are normally associated with conscious experience (e.g. the experience of moving dots in a visual illusion) and that these for this reason can replace subjective reports. The experiments have been used to argue that neural correlates of metacognition and reporting are sometimes conflated with neural correlates of consciousness, e.g. prefrontal activity (Block, 2019).

Pauen (submitted) argues that the investigators using “no-report paradigms” know when perceptual switches occur. As a consequence, they were then able to compare this particularly reliable knowledge with data both from the Optokinetic Nystagmus and from introspective reports in order to resolve the conflict between

them (Frässle et al., 2014). It turned out that the Optokinetic Nystagmus gave more precise information than the subjects' reports, which tended to miss quick shifts between the stimuli.

There are a number of unsolved problems associated with no-report methodologies as well. First of all, perceptual switches occur at a whole range of levels of the perceptual hierarchy, including early stages of information processing that are typically considered preconscious. Eye movements and changes in pupil size are known to react to e.g. retinal image stabilization and norepinephrine release from the locus coeruleus (Overgaard & Fazekas, 2016). Thus, whereas these methods can help us to avoid some confounding factors, they may still overestimate neural correlates of consciousness by including activity associated with early, unconscious activity.

Furthermore, and perhaps of even more interest to this debate, no-report paradigms are also not immune to confounds related to metacognitive events (Block, 2019). The physical act of reporting is not necessarily the greatest confound related to prefrontal activity, as the introspective acts, such as directing attention towards the contents of experience, reflections on the experiment itself, associations to stimuli etc. are often debated as typical metacognitive confounds in experiments on consciousness. Refraining to utter a verbal report does not in itself rule out that all other neural activities related to introspection can be present.

Pauen (submitted) and others have still argued that the optokinetic nystagmus may be more precise as a measure of consciousness than any report. But let us consider the claim that the nystagmus phenomenon is not at all a measure of consciousness but that it instead, on the contrary, is something like a reflex. In such a case, it would rather be a candidate as an experimental contrast to conscious states rather than a measure of a conscious state in itself. In order to argue that it is not a reflex, but a measure of consciousness, one has to appeal to the introspective observation of whether the content of consciousness correlates with nystagmus shifts. In case such an introspective observation suggests that the conscious content does not follow the shifts, it seems hard to argue why we should keep believing that nystagmus shifts are not simply reflexes or something similar to a reflex. In other words, no-report paradigms do not work independently of introspection and report.

Why should one, to begin with, introduce a method such as binocular rivalry or the optokinetic nystagmus paradigm to study consciousness – if it were not from the introspective observation that those phenomena are associated with consciousness? In other words, already as a precondition of the no-report experimental designs, they are selected based on the correlation with introspection and report that they, at least according to some scientists, seek to avoid. So, whereas such methods intuitively seem to circumvent some of the criticism associated with introspection and report, introspection is not avoided, and subjective methods are just one step in the background.

Victor Lamme (2010) proposed that the study of consciousness should not be based on introspection. Nevertheless, Lamme understands consciousness as a subjective phenomenon, and introspection as the way in which we acquire knowledge about consciousness.

Lamme attempts to get out of this dilemma by introducing “neural arguments”. Neural arguments, it seems, differ from neural correlates in such a way that they

may be used to make conclusions about conscious experiences. Lamme argues that “we have to decide which are the essential qualities [...] that would ‘produce’ the phenomenality” (p. 19) and then look for conditions where these essential qualities are present. This, then, would be our introspection-free method to decide whether a subject is conscious without having to ask any direct question about it.

Lamme poses “neural arguments” to decide whether “superficial recurrent processing” should be associated with conscious experience, as Lamme thinks “widespread recurrent processing” should. Were we now to believe that “recurrent processing” is so strongly associated with consciousness that the latter never would appear without the first, we would still not have found such an introspection-free method. To arrive at this association, one would have to conduct several experiments, correlating recurrent processes with consciousness – using introspecting experimental participants.

Consequently, this method would not be independent of introspection but carry along the strengths, weaknesses and limitations held by introspection. Hence, the “neural argument” method can be no stronger than “neural correlates of introspective reports”. In other words, it seems also in Lamme’s approach that the attempt to disregard introspection just leads to the realization that we are fully dependent on it. In fact, it seems a necessary logical consequence of any method, suggesting an independent objective measure of consciousness.

As mentioned above, Pauen’s approach seems to differ from those who argue that subjective reports are completely without use. But how would Pauen’s perspective play out in practice? To find out, Pauen appeals to historical analogies as a replacement of subjective methods with more precise objective methods have worked before in other domains. However, such historical analogies risk being nothing more than appeals and statements of intention. Pauen’s example of light that was studied before any devices to study it objectively were invented is classical. The example is intended to show that we have previously been dependent on subjective reports to measure a phenomenon, and that we have now replaced this measure with more precise objective methods. The example, however, forgets an important distinction – *the* distinction relevant for the question: We have been able to replace subjective measures in order to answer questions about the physical aspects and properties of light. However, we have not successfully replaced subjective measures in order to study how we experience light. Clearly, this will also be the case with any similar analogy.

Science would normally consider light ontologically different from its appearance. Thus, we must maintain a view that it relates to or is identical with properties outside of our perception. However, consciousness is by the most accounts identical with its appearance. As our only reason to believe in its existence comes from our introspective knowledge of it, and since functions and behavior that are not correlated with introspective evidence of consciousness are normally categorized as unconscious mental states, there is no reason to believe that there is consciousness “hiding” outside our access to it (Overgaard & Sandberg, 2021).

Pauen (submitted) challenges the idea that there is anything special about introspective knowledge. He argues that it is not any different from other types of knowledge, i.e. he argues that introspection is not epistemically special. Whereas Pauen offers important insights to support this point, e.g. that all types of knowledge are

mediated by cognitive processes that are always fallible, consciousness differs epistemically from other worldly phenomena in that cannot exist independently of subjective experience, or, said differently, other phenomena such as light are different from the subjective experience of them.

The argumentation above suggests that there is no alternative to subjective reports – or at least that the attempts to do without do not work. This view, however, does not stand unchallenged and does not come free of problems. Pauen presents confabulation as one challenge. He presents the very rare case of Anton's syndrome, which is the case of cortical blindness combined with a denial of this blindness (Prigatano & Schacter, 1991). Where Anton's syndrome is a rare and extreme case of pathological lack of insight, neuropsychological literature is full of such (most often less spectacular) cases of denial, such as visuospatial neglect. These seem to be cases of metacognitive impairment (Barba et al., 2018) showing that higher order interpretations of the conscious content are not necessarily identical to it. As a stand-alone argument against subjective measures of consciousness, it is however not very strong as it would be like arguing that we must give up on objective measures altogether if apparatus can be broken or malfunction in rare cases. Nevertheless, the argument does show that subjective reports are not necessarily identical to conscious content, and thus, it can work against a naïve approach to introspection that all subjective reports are trustworthy. This naïve view is however hard to find represented in the current debate, and seems thus as an attack on a straw man.

Arguments against introspection as a core method in consciousness research often make the point that reports about consciousness are not infallible. However, the argument presented here is not that such reports are infallible. Instead, the argument is that since all other measures of consciousness are directly or indirectly derived from introspection, we should rather accept this fact, and attempt to improve introspective methods.

Imagine now that someone would introduce a device to detect pain based on a physiological signal. This signal, naturally, could not be selected randomly but based on correlations with subjective report – or – even more indirectly, based on correlations with other signals or behaviours which then have been correlated with report or introspective observation. The precision of such a device could be determined based on its ability to predict the content of subjective reports. But what, then, would happen if one day, the well-performing device would be in conflict with report? If the device told us a person who denied to be in pain in fact was in pain? Or, the other way around, if the person insisted to be in pain, but the device told us, she was not? In such cases, it would be difficult to believe the device over the report as the device-report comparison itself is the test to decide the precision of the device. Clearly, one cannot on the one hand use report as the correlate to build the device, and to test the device, and hereafter claim that the device is better or more precise than the report.

Historically, Nisbett & Wilson's, 1977 essay, "Telling More Than We Can Know" is one of the most-cited papers in the history of psychology. Looking at cases in which, for example, people seem to show amazing ignorance of the bases of their preference for a particular pair of socks, Nisbett and Wilson conclude that "people may have little ability to report accurately on their cognitive processes" (p. 246). In

the psychological and philosophical literature, this conclusion has been taken to suggest that subjective reports naturally lead to confabulation.

Yet Nisbett and Wilson themselves are quite clear that they do not intend their thesis that way. In a section titled "Confusion Between Content and Process" they draw a sharp distinction between "cognitive processes" (i.e. the causal process underlying and driving our cognition) and mental "content" of the same type of cognitive states. They explicitly limit their skepticism to the former. Regarding the latter they say that such "private facts... can be known with near certainty" (p. 255). In other words, despite the mythology, Nisbett and Wilson are not skeptics about introspective report of conscious experiences. They are skeptics about introspective knowledge of the causes of those experiences, which is a very different matter. They are skeptical about our knowledge of why we selected a particular brand of socks, but not about the fact that we do judge them to be superior or about our sensory experience as we select them.

3 Methodological "dualism": Combining different measures

So far, I have attempted to make the case that consciousness research will always need introspection. All objective methods rest upon subjective methods, and thus, one cannot completely replace subjective methods with the objective methods. That said, researchers criticizing subjective methods such as Pauen, and many before him, present the important challenge that subjective reports are not perfect. A number of issues, such as bias or confabulation, can be raised against the validity of subjective reports.

However, as objective measures in various domains have been developed to increase precision and minimize error, similar work has been done with subjective methods. Nevertheless, current discussions are more often a debate of what does not work in the other "camp", combined with defense of one's own camp, rather than an attempt to actually develop methodologies to account for those issues that are reasonably raised.

One approach to this has been the attempt to capture minor variations in certain dimensions of subjective experience, e.g. the Perceptual Awareness Scale that measures intensity of visual experience (Ramsøy & Overgaard, 2004; Sandberg & Overgaard, 2015; Lohse & Overgaard, 2019). Other measures have investigated variations in confidence ratings (Rausch & Zehetleitner, 2016), and yet others have used even more open reports methodologies (e.g. The Descriptive Experience Sampling Method, Hurlburt & Akhter, 2006). Although there are still discussions about what may constitute the optimal measure (Szczepanowski et al. (2013); Dienes and Seth (2010); Timmermans et al., 2010), they share the view that a detailed subjective report may be imprecise yet better than an indirect measure, and research using different types of subjective measurements have not only made progress in the methods themselves, but provided new insights into consciousness that would not have happened without. Several debates exist among proponents of different subjective methodologies, which can be seen as an example of the

attempt to go beyond a “for and against perspective” on subjective reports, but rather to develop reports, and answer to some of the reasonably raised criticism.

By far, gradual subjective measures of consciousness have primarily been used to investigate to which degree conscious and unconscious processes contribute to a particular performance. The first study that introduced the Perceptual Awareness Scale (PAS) revealed that the amount of measured unconscious influence on a discrimination task depended on the subjective rating scale (Ramsøy & Overgaard, 2004). At “No experience” rating, participants were at base chance, whereas when participants performed the same task using a dichotomous scale, massive unconscious influences were found. This result – that the measured unconscious influence is much lower and typically non-existing – has been replicated many times (Overgaard et al., 2006; Sandberg et al., 2010; Timmermans et al., 2010). The effect has been found in many different paradigms and settings that typically have been used to argue in favour of the existence of unconscious processes. In a “blindsight patient”, it was found that the blindsight phenomenon relied on vague perception rather than unconscious perception (Overgaard, 2011; Overgaard & Grünbaum, 2011; Overgaard & Mogensen, 2015; Overgaard et al., 2008), which was independently replicated in another blindsight patient by another research group (Mazzi et al., 2016). Various experimental paradigms claimed to be objective approaches to consciousness and that have been used to argue a massive amount of unconscious influence on behaviour have been revealed to indicate the exact opposite using PAS. As one example, exclusion tasks seem to require weak glimpses of the stimulus (Sandberg et al., 2014). In another study, it was showed that emotional priming only works when there is some degree of experience (weak glimpses) of the prime. Other experiments using PAS found that auditory affective processing requires consciousness (Lähteenmäki et al., 2019; Overgaard et al., 2013).

In one recent experiment, a false feedback paradigm was used to investigate whether confidence ratings (reports on the performance of a task) and PAS relate to different processes (Skewes et al., 2021). Participants were asked to perform a standard psychophysical detection task and report using either PAS or confidence ratings (both presented as comparable four-point scales). Using feedback to selectively intervene either on PAS or confidence ratings, the effects of these interventions could be measured on response accuracy, on reports of perceptual awareness, and on response confidence. False feedback based on PAS responses reliably reduced not only the PAS responses themselves, but also their accuracy on the task. False feedback based on confidence ratings did not reduce objective performance. The results suggest that different processes underlie different types of metacognitive reports (as previously predicted by Overgaard & Mogensen, 2017 and discussed by Overgaard & Sandberg, 2012). In other words, if confidence ratings, subjective reports, and other metacognitive measures can be separated conceptually and empirically, there seems to be strong evidence that there are in fact ontologically different “types” of metacognitive access to the content of subjective experience.

4 A middle ground?

The findings and arguments above suggest that consciousness research should not just discuss “for and against” subjective reporting, but also differences and similarities between types of report, types of access, and how such varieties of access relate to conscious content and behaviour.

In the above, PAS is presented as a method and an approach to study consciousness – yet it should not be defended as “the one and only measure of consciousness”. It represents a standpoint, and it takes the consequence of its assumption—that a measure of consciousness must be grounded in the conscious subject rather than a theoretical abstraction. However, there are cases when access to subjective reports is limited e.g. in infants, other species, and neurological or psychiatric conditions. In some cases, objective methods may be all that we have, e.g. in patients in coma or vegetative state. In such a situation, clearly, the objective measure applied will not be random but derived from other experiments where the selected objectively measurable states have been correlated with subjective reports. However, applying such a measure on this background is not simple. After brain injury, the brain will undergo massive plastic reorganization, and after neurorehabilitation, the physical correlates of the rehabilitated functions may be very different than prior to the injury. Accordingly, applying an objective measure collected from experiments on healthy participants on noncommunicating patients may be the best we can do, but should be done without a strong assumption as two very different brains are being compared. The same type of challenge of multiple realization will apply to other cases where subjective reports are not an option, e.g. in other species. This is not in itself an argument to refrain from using objective measures alone in the absence of other possibilities, but it should be reflected in the types of conclusions drawn from the experiments.

Whereas the conclusion from the line of argument above seems to be that there is no consciousness research without the inclusion of subjective methods, the consequence drawn is not that there is no room for improvement or methodological development. On the very contrary, there are different paths that seem fruitful. As proposed in the above, one such path is the refinement and continued development of subjective methods. Rather than attempting to avoid such methods, one may work directly with them to overcome the weaknesses. Surprisingly few have so far taken this path, and most have instead discussed the sufficiency or insufficiency of one or the other “type” of methods. Alternatively, one may look for ways in which subjective and objective methods may cooperate, so that objective measures of consciousness are applied to supplement subjective measures rather than to replace them (Tsuchiya et al., 2016).

Proposals to combine methods naturally seem as a practical and intuitive way forward, but will need some concrete ideas for how this combination should happen. Varela (1996) and other proponents of neurophenomenology suggested that subjective and objective data should work together in reciprocal constraints as one of the very few attempts to explicitly characterize the potential relation between the “sets” of measures. At the very foundation of neurophenomenology

we find the idea that “phenomenological accounts of the structure of experience and their counterparts in cognitive science relate to each other through reciprocal constraints” (Varela, 1996, p. 343).

So, can subjective measures set up constraints for cognitive neuroscience? When one creates models or looks for neural correlates to mental phenomena, a basic change or just an increased level of detail in the conceptualisation of mental phenomena would change the models and the found correlates as well. Subjective measures could potentially enrich cognitive neuroscience by adding to it a more precise description of its object of research. For example, as in a study by Lutz et al. (2002), a neuroscientist might choose to develop the categories together with the subjects instead of doing it beforehand – as it was also done with PAS (Andersen et al., 2016). Such experiments will naturally result in different activations than experiments where reporting categories were predetermined. Thus, subjective measures could potentially result in more precise neuroscientific data.

Can cognitive neuroscience, then, set up constraints for phenomenology? Every variety of subjective measures is based upon experiences. If cognitive neuroscientists believe, say, that the neural substrate of a given process of thought is brain area X and Y, and later on discover that it is actually brain area X, Y, and Z, our lived experiences of this process of thought would not change accordingly. Thus, of course, our descriptions of these experiences will remain unchanged as well. Say that brain area Z is a component of the visual cortex. This might inspire us to re-examine whether the thought process in question has a perceptual component, but if the phenomenological investigation does not come up with a positive answer, nothing has changed. No result in cognitive neuroscience would ever change the content of introspection. At the very best, it might inspire us to ask more specific introspective questions, but that seems to be the limit (Overgaard, 2004).

One may of course imagine potential counterexamples. If a Husserlian phenomenologist suggests that memory involves a reactivation of perceptual experience, cognitive neuroscience may confirm or disconfirm this idea (see Gallagher, 2003). Although this particular idea has been confirmed by the discovery of activation in the sensory areas during certain memory tasks, if in fact it turned out to be the case that activation of sensory areas did not occur during memory tasks, would not the phenomenologist have to re-examine such claims? However, these examples reflect back upon how cognitive neuroscience collects its data, and the same methodological constraint mentioned above re-appears. The brain areas that have come to be known as “sensory areas” have only been recognized as such based on a collection of reports about experienced sensations. So, while it is true that the co-activation of certain brain areas normally associated with specific experiences might inspire new questions regarding the content of subjective experience, for the same reason as argued above, such a neuroscientific finding would not overrule a subjective report of the opposite. In other words, if a person says there is no perceptual content related to a memory, a scientist could not argue that the person, in deed, does have such an experience based on neural correlates.

Is there any way forward at all? From the arguments above, it can be taken that subjective methods are not always precise, yet they seem necessary and irreducible to objective measures. Subjective methods can be improved to represent

the content of consciousness better, as e.g. Ramsøy and Overgaard (2004), Dong et al. (2015), and Lutz et al. (2002) have attempted. Subjective measures can shape experimental categories and be used to interpret results from objective measures, but not vice versa.

In this situation, subjective and objective methods should not be seen as competing for the prize as the best measure of consciousness, but rather be seen as playing different roles and measuring different things.

In a neuroscientific context, subjective measures would naturally take the role of 1) shaping experimental categories, 2) training participants, 3) gathering data to represent the current experience of the participant, and 4) shaping analytic categories.

Subjective measures shape experimental categories in the sense that introspective knowledge (from the experimenter's own observations or gathered by participants in other experiments) determines which categories it will make sense to compare. Without subjective measures, questions about perception, emotional states, dreams, and any other concept referring to an experience would make no sense, as they all derive from introspective knowledge. With an improved vocabulary and understanding of subjective measures, such category shaping can be methodologically refined to ask still more exact questions.

Subjective measures would naturally be involved in the gathering of data about subjective experience. This has classically taken the shape of a verbal report, but could be any type of communication directly referring to the content of consciousness. Any experiment using subjective measures would naturally train participants in their use. Training has historically been criticized as it may introduce a bias, yet any reporting method would naturally introduce the bias of the individual participant's prior experiences. With thoughtful training, it can be ensured that participants have a similar understanding of the reporting categories as described in e.g. Sandberg and Overgaard (2015).

Subjective measures can be used to identify categories for analysis. This naturally comes out of an experiment where subjective reports have been the main or among the main methods applied, but can also come out of post-hoc questionnaires or other similar ways to learn more about the dataset that was obtained using objective measures.

In conclusion, I have attempted to analyze the problem of objective and subjective measures from a somewhat more practical than principal position. The analysis has led to the proposal that subjective reports in some form are unavoidable in the empirical study of consciousness, as all other measures are derived from them. I argue that many problems relate to subjective reports as they can be imprecise and vulnerable to a number of potential confounding factors. I also argue that the most realistic suggestion for a "middle ground" is to attempt to improve subjective reports, and that objective measures can never replace subjective reports. In most cases where subjective and objective measures lead to different conclusions, one is forced to believe the subjective one, as the objective measure is calibrated on subjective measures to begin with. The matter is complicated and practice will have cases where such decisions are not as easy or black and white as they appear when debating them in principle. I propose that a discussion of how to evolve both subjective and objective measures and how they are applied in experiments is of more value than the "methodological reductionist" approach.

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